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ABSTRACT

This task analysis guide is intended to help teachers and administrators develop instructional materials and implement competency-based education in the horticulture program. Section 1 contains a validated task inventory for horticulture III, IV, and V. For each task, applicable information pertaining to performance and enabling objectives, criterion-referenced measures, and suggested instructional activities and aids is provided. In this section, tasks are arranged by worker duty area only, and no attempt is made to sequence tasks in instructional order. Section 2 provides descriptions of the horticulture program and courses. These materials follow: suggested task sequence listings and course outlines for horticulture III, IV, and V. The instructional topics within the course outlines have been cross-referenced with corresponding task/competency codes from the task inventory in Section 1. A list of resources is appended. (YLB)

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TASK ANALYSES:

HORTICULTURE
III, IV, AND V

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COMPETENCY-BASED
CBE
EDUCATION

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GUIDE APPLICATION

This task analyses guide is based on the following Dictionary of Occupational Titles (DOT) job titles in the occupational domain of horticulture:

Dot Job Title	Dot Code
Floral Designer	142.081-010
Greenskeeper II	406.683-010
Horticultural and Nursery Products Salesperson	272.357-022
Horticultural-Specialty Farming Supervisor	405.131-010
Horticultural Worker I	405.684-014
Horticultural Worker II	405.687-014
Industrial-Commercial Groundskeeper	406.684-014
Inside Horticultural-Specialty Grower	405.161-018
Landscape Gardener	408.161-010
Landscape Laborer	408.687-014
Lawn-Service Worker	408.684-010
Nursery Manager	180.167-042
Parks and Grounds Groundskeeper	406.687-101
Plant Propagator	405.361-010

The guide is of use in developing and selecting instructional materials and in implementing competency-based education for the following program and courses:

Program	Courses
Horticulture (01.0601)	Horticulture III (8034) Horticulture IV (8036) Horticulture V (8038)

Additional information concerning the application and use of this publication may be obtained from the following office:

Agricultural Education Service
Vocational and Adult Education
Department of Education
P.O. Box 6Q
Richmond, Virginia 23216

TASK ANALYSES

FOR

HORTICULTURE

DEVELOPED BY

ARLINGTON PUBLIC SCHOOLS
DINWIDDIE COUNTY PUBLIC SCHOOLS

AND

VIRGINIA VOCATIONAL CURRICULUM CENTER

IN COOPERATION WITH

COMMONWEALTH OF VIRGINIA
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1985

FOREWORD

In the next decade, businesses and industries in Virginia will require large numbers of skilled workers. Therefore, vocational education at the secondary and postsecondary levels will have the responsibility of preparing individuals for a variety of occupations.

Competency-based education (CBE) provides the preparation students need for entry into the Virginia work force. The CBE practice of recording competencies developed by students helps them to make a smooth transition between secondary and postsecondary programs when both levels of education are required for career training. In addition, CBE is effective in retraining workers who have been displaced because of changing technology.

This guide will assist teachers and administrators in developing instructional materials that meet the needs of students and industry and comply with the Virginia CBE standards for vocational and adult education.

S. John Davis
Superintendent of Public Instruction

Dewey T. Oakley, Jr.
Acting Administrative Director
Vocational and Adult Education

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This task analyses guide was initially developed by educators from Arlington Public Schools and Dinwiddie County Public Schools. The time, effort, and original writing of Norman C. Olgers, Dinwiddie County Senior High School, Lynda Smet, Arlington Career Center, and Barbara Wallace, Rowanty Vocational Technical Center are gratefully acknowledged. Invaluable assistance was also provided by Dr. Alan McDaniel, Consultant, Virginia Polytechnic Institute and State University.

The project staffs of these two school systems, including Hattie M. Walker, Mildred Andra Witten, William P. Young, and Edwina K. Lake are recognized for their management of the project and their efforts in reviewing and editing the guide.

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Dr. Kay B. Brown, Vocational Curriculum Development Supervisor, Virginia Department of Education, is recognized for coordinating the final publication process. The organization and editorial revisions necessary to prepare the manuscript for publication were performed by the Virginia Vocational Curriculum Center, administered by the Henrico County Public Schools, Department of Vocational and Community Education:

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INTRODUCTION

This task analyses guide is designed to be used in combination with the Agricultural Education Service Area Resource in order to implement competency-based education in the Horticulture program. The service area resource contains information that pertains to all programs within the Agricultural Education area; the sections of that publication are entitled Occupational Information, Student Organization (FFA), Classroom Management Systems, and Recording Systems. The task analyses guide contains the task inventory, suggested task sequence lists, and content outlines for the specific courses in Horticulture III, IV, and V. Detailed instructions for combined use of these two publications are contained within the service area resource.

Using the Task Analyses

Section 1 contains a validated task inventory for Horticulture III, IV, and V. For each task, applicable information pertaining to performance and enabling objectives, criterion-referenced measures, and suggested instructional activities and aids is provided. Tasks are arranged by worker duty area only, and the suggested task sequence lists from Section 2 (as adapted by the local system) should be used to establish teaching order of the tasks.

Section 2 of the task analyses guide provides descriptions of the Horticulture program and courses, followed by suggested task sequence listings and course outlines for Horticulture III, IV, and V. The instructional topics within the course outlines have been cross-referenced with corresponding task/competency codes from the task inventory in Section 1.

It is suggested that the Section 2 task sequence lists and course content outlines be reviewed initially in order that any desired changes in sequencing of instruction be made. Once the sequencing is confirmed, instructional planning and implementation may proceed through referral to the Section 1 task/competency sheet noted beside each instructional topic within the outline.

SECTION 1.

TASK INVENTORY

One of the major characteristics of competency-based education (CBE) is that the course content is based upon actual jobs or tasks performed by the worker. In Virginia, the Department of Education has established standards for competency-based education. According to these standards, competencies must be role-relevant and based upon appropriate research. This standard states:

> Role-relevant competencies are identified and stated.
>
> The competencies, with standards, will be identified through V-TECS, IDECC, and other appropriate research. Advisory committees should be used to review competencies and standards. Competencies in the affective domain will be included. Role-relevant competencies for occupational preparation programs are those that specifically relate to the occupation for which the student is being prepared, as well as to the personal needs of the student. Role-relevant competencies are related also to orientation, exploration, and/or industrial arts experiences which have been identified for students.

Therefore, role-relevant jobs or tasks, called competencies in CBE, must be identified and validated before instructional materials are developed and subsequent instruction takes place. The task list in this task analyses guide is based on the following:

1. Job titles and descriptions found in the Occupational Outlook Handbook and the Dictionary of Occupational Titles
2. Input from agricultural education supervisors and experienced horticulture teachers.

Information collected and reviewed from these sources was used to develop an initial task list. The next step involved in preparing the final task inventory was validation of the task list. Validation is essential if the information collected is to be useful in operating CBE courses and programs. The validation process included interviews with various professionals involved in both horticulture occupations and teachers of horticulture on the secondary level.

The task analysis sheets are arranged by duty areas for the specific domain covered by the guide. Information contained on each sheet is as follows:

1. The task/competency for a given duty area which is performed by incumbent workers
2. Program and course application information
3. Performance and enabling objectives for instructional planning
4. Criterion-referenced measures of test items used to determine successful attainment of the task/competency by the student
5. Instructional activities and steps required for teaching the task/competency
6. Tools, equipment, and materials/supplies required to provide necessary instruction
7. References and audiovisual materials helpful in teaching the task/competency.

Some criterion-referenced measures involve the use of a checklist to evaluate student performance. In some cases, a checklist is provided and is included with the specific task.

In many instances, learning activities leading to mastery of task/competencies outlined in this section may take place in a cooperative work setting or in actual school- or community-related opportunities for horiculture. However, all performance objectives are presented for classroom or laboratory instruction so they may be used in localities where these opportunities do not exist; they may be easily adapted to actual work situations.

TASK INVENTORY
FOR

HORTICULTURE III, IV, AND V

DUTY AREAS

1. Completing an Agricultural Orientation Program
2. Participating in an Supervised Occupational Experience Program (SOEP)
3. Receiving Leadership Training
4. Preparing and Improving Soil and Growing Media
5. Propagating Seeds, Cuttings, and Plants
6. Cultivating Greenhouse and Nursery Plants
7. Controlling Pests
8. Installing and Regulating Environmental Control Systems and Devices
9. Harvesting Crops
10. Storing and Shipping Plants and Supplies
11. Designing Floral and Plant Arrangements
12. Maintaining and Displaying Merchandise
13. Selling Horticultural Products
14. Organizing Work and Keeping Records
15. Establishing Landscapes and Turf
16. Maintaining Turf, Greens, and Landscapes
17. Constructing and Maintaining Landscape and Greens Facilities
18. Operating and Maintaining Power Equipment
19. Maintaining and Repairing Equipment
20. Investigating Job Opportunities and Requirements

DUTY AREA

1. COMPLETING AN AGRICULTURAL ORIENTATION PROGRAM

TASKS/COMPETENCIES

1.1 Follow departmental policies

1.2 Practice safety procedures

1.3 Plan laboratory project

1.4 Clean sales, work, and storage areas

Application

DUTY AREA

1. COMPLETING AN AGRICULTURAL ORIENTATION PROGRAM

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

1.1 Follow departmental policies

COURSE

Horticulture III (8034)

1.1

PERFORMANCE OBJECTIVE

P1.1 Given a copy of departmental policies concerning student responsibilities, procedures for daily operation, safety rules, and course objectives and evaluation procedures, follow the policies in classroom and laboratory work. Compliance will be evaluated on an on-going basis and must be rated acceptable according to an instructor-prepared checklist.

SELECTED ENABLING OBJECTIVES

E1.1.1 Identify student responsibilities in the classroom, laboratory, and on field trips.

E1.1.2 Identify procedures for the daily operation of the department.

E1.1.3 Demonstrate safe operation of equipment and identify appropriate safety procedures.

E1.1.4 Identify instructional objectives and evaluation procedures.

CRITERION-REFERENCED MEASURE

C1.1 Departmental policies followed according to instructor-prepared checklist with all items rated acceptable.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Assist the students in planning their responsibilities in the classroom, laboratory, and on field trips (E1.1.1).
2. Discuss departmental procedures in relation to appropriate classroom conduct (E1.1.2).
3. Review the safe operation of equipment and emphasize all safety procedures (E1.1.3).
4. Explain instructional objectives, testing, grading, and evaluation procedures (E1.1.4).

SELECTED TOOLS AND MATERIALS

Handouts: Department policies
Instructor-prepared checklist

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Practices for Conducting an Effective Agricultural Laboratory Program, 1975. Crunkilton.

—— Application ——

DUTY AREA

1. COMPLETING AN AGRICULTURAL ORIENTATION PROGRAM

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

1.2 Practice safety procedures

COURSE

Horticulture III (8034)

1.2

PERFORMANCE OBJECTIVE

P1.2 Given personal protective equipment, instruction in safe operation of power tools, and necessary equipment and supplies, practice safety procedures. Safety will be evaluated on an on-going basis and must be rated acceptable according to instructor-prepared checklist.

SELECTED ENABLING OBJECTIVES

E1.2.1 Relate general safety instructions in the use of personal safety equipment, laboratory equipment, and supplies.

E1.2.2 Demonstrate the proper use of tools, equipment, supplies, and personal safety equipment.

E1.2.3 Demonstrate the proper operation of the fire extinguishers located in the horticulture laboratories.

E1.2.4 Interpret safety signs, symbols, and color codes.

CRITERION-REFERENCED MEASURE

C1.2 Safety procedures practiced; all items on instructor-prepared checklist rated acceptable.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss general safety procedures; demonstrate safety precautions to be observed when using laboratory equipment, tools, and supplies (E1.2.1, E1.2.2).
2. Identify the location(s) of fire extinguisher(s); discuss operation and application (E1.2.3).
3. Discuss safety signs, symbols, and color codes (E1.2.4).
4. Have students read equipment operator's manuals, and discuss safety procedures relating to specific pieces of equipment (E1.2.2).

SELECTED TOOLS AND MATERIALS

Equipment operator's manuals
Fire extinguishers
Personal safety equipment
Handout: Instructor-prepared checklist

SELECTED AUDIOVISUAL MATERIALS

AV Packet: Power Tool Safety. Hobar.
Slides: Developing Shop Safety Skills. AAVIM.

SELECTED REFERENCES

Developing Shop Safety Skills, 1981. AAVIM.
Mechanics in Agriculture, 2nd ed. Phipps.
Planning, Organizing and Teaching Agricultural Mechanics, 1980. Bear and Hoerner.

DUTY AREA
1. COMPLETING AN AGRICULTURAL ORIENTATION PROGRAM

PROGRAM
HORTICULTURE (01.0601)

TASK/COMPETENCY
1.3 Plan laboratory project

COURSE
Horticulture III (8034)

1.3

PERFORMANCE OBJECTIVE

P1.3 Given guidelines and project assignment, plan a laboratory project. Plans must include a written description or drawing, an accurate bill of materials, and a realistic cost estimate, and must be prepared according to guidelines provided.

SELECTED ENABLING OBJECTIVES

E1.3.1 Secure a plan for a project.

E1.3.2 Prepare a bill of materials for the project.

E1.3.3 Describe factors to consider when estimating the cost of a project.

E1.3.4 Identify areas to be included in a drawing or a written description of a project.

CRITERION-REFERENCED MEASURE

C1.3 Project plans prepared according to instructor's guidelines, to include a written description or drawing, an accurate bill of materials, and a realistic cost estimate.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have the student locate or draw the plan for a project (E1.3.1).
2. Have the student determine the materials needed and estimate the cost (E1.3.2, E1.3.3).
3. Review guidelines emphasizing acceptable and unacceptable aspects of any project (E1.3.1-E1.3.4).

SELECTED TOOLS AND MATERIALS

Project plans
Handout: Instructor-prepared guidelines

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Agricultural Mechanics Plans for Shop Projects. Instructional Materials Laboratory, University of Missouri, Columbia.
Direct Student Laboratory Experience C-7, Performance Based Teacher Education Module, AAVIM.
Planning Project Construction. Vocational Resources.

— Application —

DUTY AREA

1. COMPLETING AN AGRICULTURAL ORIENTATION PROGRAM

TASK / COMPETENCY

1.4 Clean sales, work, and storage areas

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

1.4

PERFORMANCE OBJECTIVE

P1.4 Given a designated area and the necessary equipment and supplies, clean sales, work, and storage areas. Area maintenance will be evaluated on a periodic basis, and all items on instructor-prepared checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E1.4.1 Identify areas to be cleaned.

E1.4.2 Identify storage areas and items to be stored.

E1.4.3 Explain cleaning schedule and identify personnel responsible for specific cleaning duties.

E1.4.4 Demonstrate proper storage.

CRITERION-REFERENCED MEASURE

C1.4 Sales, work, and storage areas cleaned; all items on instructor-prepared checklist rated acceptable.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students participate in a discussion of procedures for keeping work and storage areas neat and clean (E1.4.1-E1.4.4).
2. Have students practice arranging all items in predetermined places (E1.4.4).
3. Have students perform the cleaning or serve as supervisor of the cleaning area, rotating these duties and areas to be cleaned (E1.4.4).

SELECTED TOOLS AND MATERIALS

Cleaning equipment, as appropriate
Cleanup schedule
Handout: Instructor-prepared checklist

SELECTED AUDIOVISUAL MATERIALS

Slides: Developing Shop Safety Skills. AAVIM.

SELECTED REFERENCES

Developing Shop Safety Skills. AAVIM.

DUTY AREA

2. PARTICIPATING IN SUPERVISED OCCUPATIONAL EXPERIENCE PROGRAM (SOEP)

TASKS/COMPETENCIES

2.1 Plan a supervised occupational experience program

2.2 Summarize records of SOEP

2.3 Develop and execute an agreement

2.4 Apply for an Future Farmers of America (FFA) proficiency award

2.5 Plan off-farm jobs

2.6 Identify fringe benefits and calculate monetary value

Application

DUTY AREA

2. PARTICIPATING IN AN SOEP

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

2.1 Plan a supervised occupational experience program

COURSE

Horticulture III (8034)
Horticulture IV (8036)
Horticulture V (8038)

2.1

PERFORMANCE OBJECTIVE

P2.1 Given guidelines and information on home environment and community employment opportunities, plan a personal occupational experience program for the years enrolled in horticulture. The plan must be approved by the instructor, using a checklist based on the guidelines and information provided.

SELECTED ENABLING OBJECTIVES

E2.1.1 Define Supervised Occupational Experience Program.

E2.1.2 Describe the types of SOE programs.

E2.1.3 List examples of SOE programs in horticulture.

E2.1.4 Describe the benefits of SOE programs.

E2.1.5 Survey local occupational situations to determine SOEP opportunities for present and future employment.

E2.1.6 Select experience programs which will meet individual needs.

CRITERION-REFERENCED MEASURE

C2.1 A supervised occupational experience program planned in accordance with guidelines, and approved by instructor.

SELECTED INSTRUCTIONAL ACTIVITIES

Use Lesson Plan A--"Recognizing SOE as a Part of Vocational Agriculture," located on pp. 26-29, Handbook, Supervised Occupational Experience Programs (E.2.1.1-E2.1.6).

SELECTED TOOLS AND MATERIALS

Charts in the Handbook, as specified in the lesson plan

SELECTED AUDIOVISUAL MATERIALS

Film: Bridging the Gap. Venard Films Ltd.
Transparencies in the Handbook, as specified in the lesson plan

SELECTED REFERENCES

Handbook, Supervised Occupational Experience. National FFA Center.
Student Handbook, Chapter 2. FFA.
Supervised Occupational Experience Programs, pp. 1-29. Virginia Department of Education.

Application

DUTY AREA
2. PARTICIPATING IN AN SOEP

PROGRAM
HORTICULTURE (01.0601)

TASK / COMPETENCY
2.2 Summarize records of SOEP

COURSE
Horticulture III (8034)
Horticulture IV (8036)
Horticulture V (8038)

2.2

PERFORMANCE OBJECTIVE
P2.2 Given a Virginia Supervised Occupational Experience Record Book with completed personal records, summarize records according to directions given in the record book.

SELECTED ENABLING OBJECTIVES
E2.2.1 Analyze enterprise records.

E2.2.2 Analyze placement program, if applicable.

E2.2.3 Develop financial statements.

E2.2.4 Interpret and use financial statements.

E2.2.5 Evaluate and replan SOE programs based on enterprise analysis and financial statements.

CRITERION-REFERENCED MEASURE
C2.2 Records summarized in accordance with directions in record book.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Use Lesson Plan D--"Analyzing an SOE Program," located on pp. 40-48 of Handbook, Supervised Occupational Experience Programs (E2.2.1-E2.2.5).

SELECTED TOOLS AND MATERIALS

Charts in the Handbook, as specified in the lesson plan
Record books

SELECTED AUDIOVISUAL MATERIALS

Transparencies in the Handbook, as specified in the lesson plan
Transparencies of completed record book pages

SELECTED REFERENCES

Handbook, Supervised Occupational Experience. National FFA Center.
Virginia Supervised Occupational Experience Record Book. McMillion.

—— Application ——

DUTY AREA

2. PARTICIPATING IN AN SOEP

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

2.3 Develop and execute an agreement

COURSE

Horticulture III (8034)
Horticulture IV (8036)
Horticulture V (8038)

2.3

PERFORMANCE OBJECTIVE

P2.3 Given employment opportunity and examples of work agreements, develop and execute an occupational experience work agreement which includes all elements in the examples.

SELECTED ENABLING OBJECTIVES

E2.3.1 Explain the purposes of a training agreement.

E2.3.2 Identify types of information needed in a training agreement.

E2.3.3 Complete a supervised occupational experience agreement.

CRITERION-REFERENCED MEASURE

C2.3 Work agreement developed and executed according to examples provided.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide and discuss several types of completed agreements (E2.3.1-E2.3.3).
2. Have students identify the type of information needed in an agreement (E2.3.2).
3. Have students develop and execute an agreement for a hypothetical situation (E2.3.3).
4. Have students develop and execute an agreement for all supervised occupational experience programs (E2.3.3).

SELECTED TOOLS AND MATERIALS

Copies of agreements

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Advisors Guide to the Student Handbook. FFA.
Virginia Supervised Occupational Experience Record Book. McMillion.
Supervised Occupational Experience Programs, pp. 31-37. Virginia Department of Education.

Application

DUTY AREA

2. PARTICIPATING IN AN SOEP

PROGRAM

Horticulture (01.0601)

TASK / COMPETENCY

2.4 Apply for an FFA proficiency award

COURSE

Horticulture III (8034)
Horticulture IV (8036)
Horticulture V (8038)

2.4

PERFORMANCE OBJECTIVE

P2.4 Given an FFA proficiency award application, apply for an FFA proficiency award by completing the form according to the guidelines provided by the instructor. The award must be based on personal supervised occupational experience program, and the completed application must be neat and of such quality that it may be turned in for area competition.

SELECTED ENABLING OBJECTIVES

E2.4.1 Select applicable proficiency awards.

E2.4.2 Identify types of information needed on the proficiency award application.

E2.4.3 Complete an FFA proficiency award application.

CRITERION-REFERENCED MEASURE

C2.4 Application form completed according to instructor-prepared guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Explain the values of proficiency awards (E2.4.1-E2.4.3).
2. Review winning proficiency award applications (E2.4.1-E2.4.3).
3. Have students complete award applications in horticulture (E2.4.1-E2.4.3).
4. Review proficiency award qualifications checklists (E2.4.1-E2.4.3).

SELECTED TOOLS AND MATERIALS

FFA proficiency award applications
Previously completed proficiency award applications
Handout: Instructor-prepared guidelines

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Agricultural Proficiency Award Handbook. National FFA Center.
Student Handbook, Chapter 6. FFA.
Advisors Guide to the Student Handbook, Chapter 6. FFA.

Application

DUTY AREA
2. PARTICIPATING IN AN SOEP

PROGRAM
HORTICULTURE (01.0601)

TASK/COMPETENCY
2.5 Plan off-farm jobs

COURSE
Horticulture III (8034)
Horticulture IV (8036)
Horticulture V (8038)

2.5

PERFORMANCE OBJECTIVE

P2.5 Given an opportunity for an off-farm job of interest and placement program guidelines, plan a placement program. Job must be consistent with personal goals and interests and placement program must be implemented according to guidelines provided.

SELECTED ENABLING OBJECTIVES

E2.5.1 Describe the characteristics of a good placement program.

E2.5.2 Plan a placement SOE program.

E2.5.3 Identify an appropriate placement station.

E2.5.4 Identify aspects of a successful job interview.

E2.5.5 Explain how to be a productive and successful employee.

E2.5.6 Explain special concerns with cooperative placement.

CRITERION-REFERENCED MEASURE

C2.5 Placement program planned according to instructor-prepared guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

Use Lesson Plan C--"Starting an SOE Placement Program," located on pp. 36-39, Handbook, Supervised Occupational Experience Programs (E2.5.1-E2.5.6).

SELECTED TOOLS AND MATERIALS

Record books for students
Example agreements and expense plans
Handout: Instructor-prepared guidelines

SELECTED AUDIOVISUAL MATERIALS

Transparencies in the Handbook, as specified in the lesson plan

SELECTED REFERENCES

Handbook, Supervised Occupational Experience Programs. National FFA Center.

Application

DUTY AREA

2. PARTICIPATING IN AN SOEP

TASK / COMPETENCY

2.6 Identify fringe benefits and calculate monetary value

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)
Horticulture IV (8036)
Horticulture V (8038)

2.6

PERFORMANCE OBJECTIVE

P2.6 Given compensation plans from a potential employer and necessary formulas, identify all fringe benefits provided by the employer and calculate the monetary value of these benefits to the employer. Monetary values must be calculated to within 5% of those calculated by the employer.

SELECTED ENABLING OBJECTIVES

E2.6.1 Identify employee fringe benefits and salary deductions.

E2.6.2 Calculate the monetary value of fringe benefits and salary deductions.

CRITERION-REFERENCED MEASURE

C2.6 Fringe benefits identified and their monetary value calculated to within 5% of those calculated by employer.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students develop a list of possible fringe benefits (E2.6.1).
2. Have each student interview a manager of a horticulture-related business (E2.6.1).
3. Have students compare values of fringe benefits provided by local horticultural businesses (E2.6.2).

SELECTED TOOLS AND MATERIALS

Handout: Formulas for calculating value of fringe benefits (instructor-prepared)

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, pp. 14-20. Boodley.
Introductory Horticulture, pp. 1-12. Reiley and Shry.

DUTY AREA

3. RECEIVING LEADERSHIP TRAINING

TASKS/COMPETENCIES

3.1 Demonstrate effective communication skills

3.2 Use accepted parliamentary procedure

3.3 Prepare and deliver a speech

3.4 Identify duties of FFA officers

3.5 Conduct or participate in a committee meeting

3.6 Conduct or participate in a panel discussion

3.7 Write a news release

3.8 Participate in an FFA public relations project

Application

DUTY AREA

3. RECEIVING LEADERSHIP TRAINING

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

3.1 Demonstrate effective communication skills

COURSE

Horticulture III (8034)
Horticulture IV(8036)
Horticulture V (8038)

3.1

PERFORMANCE OBJECTIVE

P3.1 Given a series of simulated situations which require verbal, nonverbal, and written communications with others, participate in role plays, demonstrating effective communication skills. A satisfactory rating on 80% of the items on the Communication Rating Checklist is required.

SELECTED ENABLING OBJECTIVES

E3.1.1 Explain the elements of effective verbal communication (clear voice, correct enunciation, body language consistent with verbal message, regulated volume, accuracy in repeating information, direct eye contact, maintenance of correct space).

E3.1.2 Explain the elements of effective listening (concentration, attention to nonverbal clues, lack of distractions or interruptions).

E3.1.3 Explain the elements of effective written communication (correctness, consistency, conciseness, clarity, completeness).

E3.1.4 Explain the elements of effective directions (simplicity, clarity, sequence, and elaboration if necessary).

E3.1.5 Describe the importance of communication skills to a person working in the horticultural field.

CRITERION-REFERENCED MEASURE

C3.1 Effective communication skills demonstrated by achieving a satisfactory rating of 80% on Communication Rating Checklist.

CHECKLIST 3.1

STUDENT'S NAME____________________ DUTY AREA 3

COURSE:____________________ P.O. # 3.1

DATE:____________________ STANDARD: 80% Satisfactory Rating

TEACHER'S NAME:____________________ PERFORMANCE LEVEL:__________

Communication Rating Checklist

The student:		Satisfactory	Satisfactory but Needs Improvement	Unsatisfactory
1.	Spoke in a clear, distinct voice.	____	____	____
2.	Enunciated words correctly.	____	____	____
3.	Listened attentively when spoken to.	____	____	____
4.	Carried out oral or written instructions.	____	____	____
5.	Exhibited nonverbal behavior(s) that agreed with the verbal message(s) sent.	____	____	____
6.	Accurately relayed an oral message given to him or her by one person for another person.	____	____	____
7.	Wrote an accurate message for another person, based upon oral instructions.	____	____	____
8.	Recognized and obeyed safety and health signs posted on the job and in the school laboratory.	____	____	____
9.	Regulated voice volume to account for room size, noise level, and purpose for speaking.	____	____	____

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss the elements of verbal communication and show students how its effectiveness can be destroyed by mumbling, by talking too loudly or too softly, by lack of eye contact, and by standing too close or too far away from another person (E3.1.1).

2. Show examples of body language and what happens if a person's verbal and nonverbal messages do not coincide (E3.1.1).

3. Discuss the elements of effective listening. Emphasize that research has shown that people retain only about 10 percent of what they hear, and that concentration can be improved with practice (E3.1.2).

4. Have students practice short written communications and evaluate their own compositions in regard to the "five Cs" (E3.1.3).

5. Have each student choose a simple task and write down directions on how to accomplish it, such as how to set a digital clock, how to get to a certain destination, or how to charge a car battery. Have another student evaluate the directions for clarity (E3.1.4).

6. Divide students into groups of three. Have one give a set of task directions separately to the other two, allowing only one to ask questions. Have the receivers of the directions compare their understanding of the task (E3.1.4).

7. Have students discuss why communication skills are important in business and in personal relationships, and ask them to share examples of misunderstandings that have arisen due to poor communication (E3.1.5).

SELECTED TOOLS AND MATERIALS

Social Skills Worksheet
Facets of Leadership Worksheet
FFA Officer Worksheet
A Deep Hard Look at Me Worksheet
(All worksheets available from National FFA Center)
Handout: Communication Rating Checklist #3.1

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Advisors Guide to the Student Handbook, Chapter 5. FFA.
The FFA and You, Chapter 5. Bender and others.
FFA Leadership and Personal Development. Ohio Curriculum Materials.
Student Handbook, Chapter 5. FFA.
Teaching Communication Skills. Ohio Curriculum Materials.

DUTY AREA

3. RECEIVING LEADERSHIP TRAINING

TASK / COMPETENCY

3.2 Use accepted parliamentary procedure

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)
Horticulture IV (8036)
Horticulture V (8038)

3.2

PERFORMANCE OBJECTIVE

P.3.2 Given a series of student organization meetings, use accepted parliamentary procedure by participating in the conduct of business. Individual participation will be evaluated on an on-going basis and must be rated acceptable according to Robert's Rules of Order.

SELECTED ENABLING OBJECTIVES

E3.2.1 Identify the need for the use of parliamentary procedure.

E3.2.2 List the kinds of motions by classification.

E3.2.3 Explain the characteristics of motions (second required, debatable, amendable, vote required, can be reconsidered).

E3.2.4 Demonstrate the correct procedure to handle business through parliamentary law.

CRITERION-REFERENCED MEASURE

C3.2 Parliamentary procedure used according to Robert's Rules of Order.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Present examples or illustrations showing the incorrect use of parliamentary procedure (E3.2.1).
2. Review and demonstrate the proper use of motions (E3.2.2, E3.2.3).
3. Conduct a demonstration meeting within the classroom, using parliamentary procedure (E3.2.1-E3.2.4).
4. Discuss checklist #3.1 (Communication Rating Checklist) (E3.2.4).

SELECTED TOOLS AND MATERIALS

Checklist #3.1

SELECTED AUDIOVISUAL MATERIALS

Videotape (VHS): Parliamentary Procedure. (Available from State
Filmstrip/Cassette: Parliamentary Procedure. Supervisor's Office)

SELECTED REFERENCES

Advisors Guide to the Student Handbook. FFA.
Official FFA Manual. FFA.
Robert's Rules of Order. Robert.
Student Handbook. FFA.

Application

DUTY AREA

3. RECEIVING LEADERSHIP TRAINING

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

3.3 Prepare and deliver a speech

COURSE

Horticulture III (8034)
Horticulture IV (8036)
Horticulture V (8038)

3.3

PERFORMANCE OBJECTIVE

P3.3 Given a topic of interest, prepare and deliver a speech of 6-8 minutes duration, using accepted public speaking techniques as designated in the National FFA Contest, Bulletin No. 4.

SELECTED ENABLING OBJECTIVES

E3.3.1 Identify the values of being able to participate in a public speaking contest.

E3.3.2 Identify the types of speeches.

E3.3.3 Identify the qualities of a good speaker.

CRITERION-REFERENCED MEASURE

C3.3 Speech of 6-8 minutes prepared and delivered in accordance with National FFA Contest, Bulletin No.4.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Explain the importance of being able to participate in a public speaking contest (E3.3.1).
2. Critique video or cassette tapes of winning public speeches (E3.3.1-E3.3.3).
3. Discuss the qualities of a good speaker (E3.3.3).
4. Provide an opportunity for students to make an oral presentation before a group of people (E3.3.1-E3.3.3).

SELECTED TOOLS AND MATERIALS

Judges' Score Sheet, National Public Speaking Contest
National FFA Contest, Bulletin No. 4

SELECTED AUDIOVISUAL MATERIALS

Videotapes of speeches
Cassette tapes of speeches

SELECTED REFERENCES

Improving Communications, Leadership, and Personal Development. Harp.
National FFA Contest, Bulletion No. 4. National FFA Center.

—— Application ——

DUTY AREA

3. RECEIVING LEADERSHIP TRAINING

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

3.4 Identify duties of FFA officers

COURSE

Horticulture III (8034)
Horticulture IV (8036)
Horticulture V (8038)

3.4

PERFORMANCE OBJECTIVE

P3.4 Given the student handbook, identify the duties of each FFA officer on a written quiz with 95% accuracy.

SELECTED ENABLING OBJECTIVES

E3.4.1 Identify each office in the FFA.

E3.4.2 Explain the duties and responsibilities of each office.

CRITERION-REFERENCED MEASURE

C3.4 Duties of FFA officers identified on written quiz with 95% accuracy.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review the FFA Student Handbook listing of officer duties (E3.4.1, E3.4.2).
2. Have students participate in a mock meeting as FFA officers (E3.4.1, E3.4.2).
3. Set up a mock organization and have students perform some of the duties of each officer (E3.4.1, E3.4.2).
4. Hold a special session or retreat to train FFA officers (E3.4.1, E3.4.2).

SELECTED TOOLS AND MATERIALS

Handout: Written quiz
FFA paraphernalia
Score sheet for chapter reporter's, treasurer's, and secretary's awards. Advisors Guide to the Handbook

SELECTED AUDIOVISUAL MATERIALS

Slides/Cassettes: The FFA Chapter Officer. Ohio Curriculum Materials.

SELECTED REFERENCES

Advisors Guide to the Student Handbook, Chapter 5. FFA.
The FFA and You, pp. 41-56. Bender and others.
Official Manual. FFA.
Reporter's Handbook. FFA.
Secretary's Handbook. FFA.
Student Handbook, p. 43. FFA.
Treasurer's Record Book. FFA.

Application

DUTY AREA

3. RECEIVING LEADERSHIP TRAINING

TASK / COMPETENCY

3.5 Conduct or participate in a committee meeting

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)
Horticulture IV (8036)
Horticulture V (8038)

3.5

PERFORMANCE OBJECTIVE

P3.5 Given a setting including at least two other students, conduct or participate in a committee meeting for an FFA activity. The committee should study a given problem, agree on a solution, and present a committee report to the group.

SELECTED ENABLING OBJECTIVES

E3.5.1 Identify the benefits of forming committees in an organization.

E3.5.2 Identify the duties of the chairperson.

E3.5.3 Prepare a committee report.

CRITERION-REFERENCED MEASURE

C3.5 Participation in FFA committee meeting, resulting in committee report.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss the benefits of using committees to solve problems (E3.5.1).
2. Discuss the duties of the committee chairperson (E3.5.2).
3. Have students discuss ways to prepare a committee report (E3.5.3).
4. Review task #3.1 (E3.5.3).

SELECTED TOOLS AND MATERIALS

Checklist #3.1

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

FFA Leadership Handbook. Moody and Miller.
You and the FFA, Chapter 16. Bender and others.

Application

DUTY AREA

3. RECEIVING LEADERSHIP TRAINING

TASK/COMPETENCY

3.6 Conduct or participate in a panel discussion

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)
Horticulture IV (8036)
Horticulture V (8038)

3.6

PERFORMANCE OBJECTIVE

P.3.6 Given a setting including two or more students, a list of topics concerning the horticulture course of study, and instructor guidelines, conduct or participate in a panel discussion. The panel presentation must cover a topic from the list and conform to guidelines provided.

SELECTED ENABLING OBJECTIVES

E3.6.1 Explain the benefits of a panel discussion as a learning tool.

E3.6.2 Identify the duties of the panel discussion leader.

E3.6.3 Determine the objectives to be accomplished.

E3.6.4 List characteristics of effective oral communication.

CRITERION-REFERENCED MEASURE

C3.6 Panel discussion covering a topic from list provided and in accordance with instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students observe a televised panel discussion such as Face the Nation (E3.6.1-E3.6.4).
2. Discuss the duties of the panel discussion leader (E3.6.2).
3. Have students review checklist #3.1 and relate to presenting a panel discussion (E3.6.4).
4. Present a videotape of a student panel discussion and have students critique (E3.6.1-E3.6.4).

SELECTED TOOLS AND MATERIALS

Handouts: Instructor-prepared guidelines
List of topics
Video equipment
Checklist #3.1

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

A Dozen Ways to Teach Adults in Groups, pp. 29-31. McMillion.
Improving Communications, Leadership, and Personal Development. Harp.

Application

DUTY AREA

3. RECEIVING LEADERSHIP TRAINING

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

3.7 Write a news release

COURSE

Horticulture III (8034)
Horticulture IV (8036)
Horticulture V (8038)

3.7

PERFORMANCE OBJECTIVE

P3.7 Given a horticulture activity, write a news release concerning that activity. The release should be 300 to 500 words in length, grammatically correct, and inclusive of the following information: who participated in the activity, what the activity involved, how the activity proceeded, when and where the activity occurred.

SELECTED ENABLING OBJECTIVES

E3.7.1 Write a description of an object or activity.

E3.7.2 Describe the importance of correct usage, spelling, and neatness.

E3.7.3 Identify the information that should be covered in all news releases.

E3.7.4 Describe the proper format for a news release.

CRITERION-REFERENCED MEASURE

C3.7 Grammatically correct news release, 300-500 words in length, containing the following information: who participated in the activity, what the activity involved, how the activity proceeded, when and where the activity occurred.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students prepare a description of an object or activity (E3.7.1).
2. Invite an English teacher to discuss English grammar and writing techniques (E3.7.2).
3. Discuss the information that should be included in all news releases (E3.7.3).
4. Discuss examples of properly written news releases (E3.7.3-E3.7.5).
5. Have each student write a news release (E3.7.5).
6. Analyze news releases in a newspaper (E3.7.1-E3.7.4).

SELECTED TOOLS AND MATERIALS

Newspapers

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Improving Communications, Leadership, and Personal Development. Harp.
Official Manual. FFA.
You and the FFA, pp. 346-347. Bender and others.

Application

DUTY AREA

3. RECEIVING LEADERSHIP TRAINING

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

3.8 Participate in an FFA public relations project

COURSE

Horticulture III (8034)
Horticulture IV (8036)
Horticulture V (8038)

3.8

PERFORMANCE OBJECTIVE

P3.8 Given an activity which needs publicity, participate in a public relations project. Participation in the project will be evaluated in accordance with guidelines specified by the instructor.

SELECTED ENABLING OBJECTIVES

E3.8.1 Identify the purposes of a public relations program.

E3.8.2 Determine the type of public relations project to conduct.

E3.8.3 Determine the materials needed.

E3.8.4 Determine appropriate format.

E3.8.5 Prepare materials for the project.

E3.8.6 Critique the project and make corrections.

E3.8.7 Present materials to the proper media.

CRITERION-REFERENCED MEASURE

C3.8 Participation in FFA public relations project in accordance with instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss the purposes of public relations projects (E3.8.1).
2. Discuss examples of public relations projects (E3.8.1).
3. Have the students prepare a radio program, television program, news articles, food for America program, and/or building our American communities project (E3.8.1-E3.8.7).
4. Have students develop a public relations calendar (E3.8.1 - E3.8.7).
5. Invite a public relations representative to discuss the role of public relations (E3.8.1 - E3.8.7).
6. Have students visit local newspaper, radio, and television offices (E3.8.1 - E3.8.7).

SELECTED TOOLS AND MATERIALS

National FFA week supplies
Handout: Instructor's guidelines

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Advisors Guide to the Student Handbook. FFA.
Official Manual. FFA.

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

TASKS/COMPETENCIES

4.1 Take soil samples

4.2 Analyze soil samples to determine pH levels

4.3 Mix growing media materials and fertilizers

4.4 Shred planting media

4.5 Screen planting media

4.6 Pasteurize soil

4.7 Apply lime or dolomite

4.8 Select, apply, and mix soil conditioners

4.9 Locate, shape, and form beds

4.10 Plow land

4.11 Disk land

4.12 Apply and mix fertilizers into soil beds

4.13 Till soil with hand tools

4.14 Till soil with power tools

4.15 Analyze soil samples to determine soluble salts content

Application

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

TASK / COMPETENCY

4.1 Take soil samples

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

4.1

PERFORMANCE OBJECTIVE

P4.1 Given a planting bed or other field areas, a spade, soil auger, and plastic bags or other suitable containers, take two soil samples, each comprising approximately one pint of soil, according to procedure outlined by instructor. Samples must be representative of the area and be a composite of soil taken from at least 10 different holes and from a grid covering only one soil type.

SELECTED ENABLING OBJECTIVES

E4.1.1 Identify the general area as well as the spot locations on a sketch map or grid from which the composite sample is to be collected.

E4.1.2 Collect soil to a depth of 6 inches from 10 or more locations as identified on the grid.

E4.1.3 Mix the soil taken from all locations together, combining it into a single one-pint sample.

E4.1.4 Air dry soil sample.

E4.1.5 Label the sample for laboratory testing, making sure that the area from which it came is identified.

E4.1.6 Clean and store all tools and equipment.

CRITERION-REFERENCED MEASURE

C4.1 Soil samples taken in accordance with procedure outlined by the instructor; samples representative of area and composed of soil taken from at least 10 different holes and from a grid covering only one soil type.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students determine area for soil sampling and mark at least 10 spots (E4.1.1).
2. Demonstrate proper sampling technique with spade, trowel, or other tool (E4.1.1-E4.1.3).
3. Discuss proper depth for soil sampling as it pertains to the crop being grown (E4.1.2).
4. Have students take soil sample of school athletic field or home grounds and garden plot (E4.1.2).
5. Discuss and demonstrate the importance of sampling which is representative and is a composite (E4.1.1, E4.1.2).
6. Have students practice completing forms and labeling samples to be sent to soil testing laboratory (E4.1.5).
7. Demonstrate procedures for air-drying sample (E4.1.4).
8. Review Task 1.4 (E4.1.6).

SELECTED TOOLS AND MATERIALS

Bucket
Hand trowel
Plastic bags
Soil auger
Soil testing kit
Spade
Soil testing information--Virginia Cooperative Extension Service

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 1.
Gardening-Groundskeeping. V-TECS. Performance Objectives 37 and 38.
Know Your Soil. Pamphlet available from U.S. Department of Agriculture.
The Nature and Properties of Soils, 8th ed. Brady.
Soil Testing and Fertilization. Ohio Curriculum Materials.
Taking Soil Samples. Learning Activity Package in Horticulture. VPI & SU.
Working in Horticulture, pp. 78-79. Richardson and Moore.

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

TASK/COMPETENCY

4.2 Analyze soil samples to determine pH levels

PROGRAM

HORTICULTURE (01.0601).

COURSE

Horticulture III (8034)

4.2

PERFORMANCE OBJECTIVE

P4.2 Given three equivalent soil samples, a pH test kit, and a manual of instructions, analyze soil samples to determine the soil pH for each sample. Readings on the three samples tested must agree ± 0.1 pH unit.

SELECTED ENABLING OBJECTIVES

E4.2.1 Explain the acid and alkaline concept and the soil pH relationship to plant nutrition.

E4.2.2 Draw and label the pH scale.

E4.2.3 Demonstrate pH testing procedures for a specified system (electric pH meter, colorimetric test, etc.), according to the instructional manual for that system.

E4.2.4 Demonstrate proper care and cleaning of test equipment.

CRITERION-REFERENCED MEASURE

C4.2 Soil samples analyzed accurately to within ±0.1pH unit.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students demonstrate the acid and alkaline concept, using vinegar or lemon juice and limestone-water (E4.2.1).
2. Discuss relationship of soil pH to plant nutrition (E4.2.1).
3. Provide students with a drawing of the pH scale and discuss labeling (E4.2.2).
4. Have students test soil pH of greenhouse and nursery crops (E4.2.1-E4.2.3).
5. Have student test soil pH of school turf areas (E4.2.1-E4.2.3).
6. Explain cleaning and storage procedures for each type of testing equipment (E4.2.4).

SELECTED TOOLS AND MATERIALS

Soil pH test kit (color or meter) and instruction manual
Three equivalent soil samples
Vinegar or lemon juice
Limestone-water

SELECTED AUDIOVISUAL MATERIALS

Chart:	pH color charts
Filmstrips:	Soil Types and Their Structures. Bergwall Productions. Adjustment of Soil pH and Pasturization. Bergwall Productions. Improving Soil Conditions. Singer Career Systems.
Transparency:	"Fertilizer and pH," Illustrated Horticulture. F-15, F-17, F-19.

SELECTED REFERENCES

Introductory Horticulture, pp. 29-40. Reiley and Shry.

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

TASK / COMPETENCY

4.3 Mix growing media materials and fertilizers

Application

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

4.3

PERFORMANCE OBJECTIVE

P4.3 Given the required granular fertilizers, growing media materials, shovel, hoe, and a wheelbarrow or other appropriate container, mix growing media materials and fertilizers according to volume ratio specified. Ratios must be accurate to the nearest cubic foot per cubic yard for each ingredient used in the mix, and fertilizer must be thoroughly mixed into the medium in such a way that the chemical analysis of any random samples that could be taken would be approximately the same.

SELECTED ENABLING OBJECTIVES

E4.3.1 Identify soil texture factors and the reasons for preparing soil mixes.

E4.3.2 Measure out the specified ratios of ingredients.

E4.3.3 Put ingredients into a mixing box.

E4.3.4 Identify mixing procedures for using hand and mechanical methods.

E4.3.5 Store the mixed medium in a suitable container.

CRITERION-REFERENCED MEASURE

C4.3 Growing media materials and fertilizers mixed to volume ratio specified; ratios accurate to nearest cubic foot per yard for each ingredient used, and fertilizer thoroughly mixed so that random samples approximately the same.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with samples of various types of media components, and explain the reasons for the use of each (E4.3.1).
2. Have students review basic mathematical concepts related to task (E4.3.2).
3. Demonstrate the effect of different media components and mixes on drainage (E4.3.1).
4. Have students compare growth of selected plants in different media components, mixes, and non-uniform mixes (E4.3.1).
5. Have students practice mixing media materials, using both hand and mechanical methods (E4.3.1-E4.3.5).

SELECTED TOOLS AND MATERIALS

Flat nose shovel
Garden hoe
Granular fertilizer
Ground limestone
Peat moss
Perlite
Sand
Soil mixer or mixing box
Soil tray
Vermiculite

SELECTED AUDIOVISUAL MATERIALS

Filmstrips/Cassettes: Soil Mixing and Use. Bergwall Productions.
Growing Media for Ornamental Plants. Vocational Education Productions.
Transparency: "Planting and Maintenance," Illustrated Horticulture. PM-51.

SELECTED REFERENCES

"Basic Plant and Soil Science." The Nursery Worker, Part I. Ohio Curriculum Materials.
Floriculture Worker. V-TECS. Performance Objectives 6 and 10.

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

TASK/COMPETENCY

4.4 Shred planting media

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

4.4

PERFORMANCE OBJECTIVE

P4.4 Given the required soil materials or media to be shredded and the necessary tools and equipment, shred the planting media according to instructor demonstration or guidelines. Planting media must be shredded safely and thoroughly so that there are no lumps or unshredded materials.

SELECTED ENABLING OBJECTIVES

E4.4.1 Demonstrate how to bring materials to proper moisture levels (neither too wet nor too dry).

E4.4.2 Demonstrate safe and proper operation of shredding equipment.

E4.4.3 Shovel media into shredder, being sure to control the rate to conform to the horsepower and capacity of the machine.

E4.4.4 Collect media from the shredder and place in bin.

E4.4.5 Dispose of plastic bags or other packaging materials.

CRITERION-REFERENCED MEASURE

C4.4 Planting media shredded safely and thoroughly in accordance with instructor demonstration or guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display samples of planting media to illustrate a range of moisture levels (E4.4.1).
2. Demonstrate how to operate shredding equipment, and discuss safety precautions (E4.4.2).
3. Have students practice shredding compost, bark, leaves, sphagum moss, and soil, using a shredding machine (E4.4.3-E4.4.5).

SELECTED TOOLS AND MATERIALS

Soil shredder
Shovel
Safety goggles
Work gloves
Operator's manual for shredding equipment

SELECTED AUDIOVISUAL MATERIALS

Slides/Cassettes: For Safety's Sake. Outdoor Power Equipment Institute.

SELECTED REFERENCES

None identified

——— Application ———

DUTY AREA
4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

PROGRAM
HORTICULTURE (01.0601)

TASK / COMPETENCY
4.5 Screen planting media

COURSE
Horticulture III (8034)

4.5

PERFORMANCE OBJECTIVE
P4.5 Given a soil medium, a shovel, and a screen with openings sufficiently small to eliminate lumps of soil, rocks, and other debris, screen the planting medium. Medium must be free of all large chunks of soil, trash, sticks, grass, leaves, or other forms of debris.

SELECTED ENABLING OBJECTIVES
E4.5.1 Identify the medium to be screened.

E4.5.2 Place screen over a wheelbarrow, box, or other receptacle.

E4.5.3 Place successive shovelfuls of planting medium on screen, breaking the lumps up with the hands, if necessary.

E4.5.4 Rescreen, if necessary.

E4.5.5 Shake the screen or use hoe on scraper board to pulverize medium and to remove trash and all debris.

E4.5.6 Dispose of debris in container.

E4.5.7 Clean and store equipment.

CRITERION-REFERENCED MEASURE
C4.5 Planting media screened; free of all debris.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with various soil media to be screened (E4.5.1).
2. Demonstrate how to screen various planting media (E4.5.2-E4.5.7).
3. Have students screen homemade soil mixes (E4.5.2-E4.5.7).
4. Have students screen (shred) sphagnum peat for seeding mixes (E4.5.2-E4.5.7).

SELECTED TOOLS AND MATERIALS

Screen (1/4" mesh galvanized hardware cloth)
Shovel
Wheelbarrow, box, or other receptacle

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 12.
Learning About Types of Media. Learning Activity Package in Horticulture. VPI & SU.

Application

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

TASK/COMPETENCY

4.6 Pasteurize soil

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

4.6

PERFORMANCE OBJECTIVE

P4.6 Given a medium or soil area to be pasteurized, steam applicator, thermal probe, a bench or pasteurizing bin, and the necessary tools and chemicals, pasteurize the medium or soil area. All items on an instructor-prepared checklist must be rated acceptable, and all safety precautions observed.

SELECTED ENABLING OBJECTIVES

E4.6.1 List the advantages for pasteurization of planting media.

E4.6.2 Identify sterilizing tools and equipment.

E4.6.3 Demonstrate the following procedural steps for pasteurizing prepared media with heat:
- a. Check equipment for proper operation.
- b. Cover medium and seal with cover.
- c. Turn on electric current or low pressure steam and hold at 180° F for a minimum of 30 minutes.
- d. Take readings with thermal probe to ensure that 180° F temperature is constant throughout medium.
- e. Allow medium to cool and stand until workable.
- f. Cover medium to avoid contamination.
- g. Clean all tools and equipment and return to storage.

E4.6.4 Analyze manufacturer's instructions for safe and effective use of the treatment chemical.

E4.6.5 Demonstrate the following procedural steps for pasteurizing prepared medium or soil with chemicals:
- a. Prepare soil area or medium according to instructions on chemical label.
- b. Prepare chemical and tarp cover.
  - (1) For gaseous fumigant, apply tarp, seal edges, and inject fumigant under tarp with special applicator.
  - (2) For liquid fumigants, mix chemical with water and apply uniformly over the soil. Cover soil area immediately with the tarp and seal the edges in the soil.
- c. Clean all equipment used and dispose of the fumigant containers according to manufacturer's directions.

E4.6.6 List and follow all safety precautions.

CRITERION-REFERENCED MEASURE

C4.6 Soil pasteurized with all safety procedures followed and all items on instructor-prepared checklist rated acceptable.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss advantages for pasturization of planting media (E4.6.1).
2. Display tools and media (E4.6.2).
3. Demonstrate how to pasturize prepared media or soil with heat (E4.6.3).
4. Demonstrate how to pasturize prepared media or soil with chemicals (E4.6.4-E4.6.6).
5. Emphasize safety precautions necessary when sterilizing soil (E4.6.6).
6. Have students practice pasturizing soil and planting media, using both the heat and chemical methods (E4.6.3-E4.6.6).

SELECTED TOOLS AND MATERIALS

Applicator
Chemicals (gas and liquid)
Heavy tarp (polyethelene film)
Live steam source (steam Jenny)
Shovel
Sterlizing bench
Handout: Instructor-prepared checklist
Worksheets: Nursery worksheets. Hobar
Soil thermometer
Soil tray
Steam hose

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Ball Red Book, 12 ed. Ball.
The Commerical Greenhouse, pp. 109-116. Boodley.
Floriculture Worker. V-TECS. Performance Objectives 7, 8, and 9.
Gardening-Groundskeeping. V-TECS. Performance Objectives 84 and 85.
Nursery Production. V-TECS. Performance Objective 21.

—— Application ——

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

4.7 Apply lime or dolomite

COURSE

Horticulture III (8034)

4.7

PERFORMANCE OBJECTIVE

P4.7 Given either hydrated lime or dolomitic lime, soil with a low pH, and a suitable applicator, apply the lime or dolomite to the soil. Lime must be applied evenly and at the rate (usually 1-2 tons per acre) prescribed by the instructor. Subsequent soil tests of the treated soil must show the desired reduction in soil acidity.

SELECTED ENABLING OBJECTIVES

E4.7.1 Identify lime types, uses, and factors of effectiveness (particle size, mixing, reaction time).

E4.7.2 Explain lime application rates based on starting pH and soil type.

E4.7.3 Demonstrate the following sequenced job skills:
a. Measure out lime and medium, according to required amounts.
b. Put medium in large box, wheelbarrow, or other suitable container.
c. Spread lime on top of medium.
d. Using a hoe or shovel, begin at outer edge and mix lime into medium.
e. Clean and store equipment.

CRITERION-REFERENCED MEASURE

C4.7 Lime or dolomite applied; soil tests indicate the desired reduction in soil acidity achieved.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display samples of various types of lime and discuss their characteristics and effects (E4.7.1).
2. Explain how to determine lime application rates based on starting pH and soil type (E4.7.2).
3. Demonstrate effects of non-uniform mixing on crop growth or media pH (E4.7.1-E4.7.3).
4. Demonstrate effects of lime in neutralizing acidic water solution (vinegar or other acid) (E4.7.1-E4.7.3).
5. Have students mix lime into greenhouse and nursery potting mixes (E4.7.3).
6. Have students lime nursery turf and garden plots in preparation for planting (E4.7.3).

SELECTED TOOLS AND MATERIALS

Spreader (drop-type or broadcast)
Rotary tiller or tractor and disk
Lime samples
Mixing medium
Shovel or hoe
Vinegar
Water

SELECTED AUDIOVISUAL MATERIALS

Transparency: "Fertilizer and pH," Illustrated Horticulture. F-15, F-17, F-19.

SELECTED REFERENCES

The Commercial Greenhouse, pp. 187-189. Boodley.
Introductory Horticulture, pp. 437-439. Reiley and Shry.
Liming Acid Soils. Ohio Curriculum Materials.
Managing the Greenhouse Soil Environment. Ohio Curriculum Materials.
Ornamental Horticulture, pp. 419-421. McDaniel.
Turf Management Handbook, pp. 30-42. Sprague.

Application

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

4.8 Select, apply, and mix soil conditioners

COURSE

Horticulture III (8034)

4.8

PERFORMANCE OBJECTIVE

P4.8 Given soil test recommendation for a designated growing area, the necessary tools, equipment, and a selection of soil conditioners, select, apply, and mix appropriate soil conditioners in accordance with instructor's directions. All items on instructor-prepared checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E4.8.1 Interpret soil test results.

E4.8.2 Define organic matter, pH, perlite, vermiculite, sand, gypsum, compost, water-holding capacity.

E4.8.3 Select conditioner to meet requirements of pH, water-holding capacity, drainage, and fertility.

E4.8.4 Outline procedure for mixing soil conditioner.

CRITERION-REFERENCED MEASURE

C4.8 Soil conditioners selected, applied, and mixed, with all items on instructor-prepared checklist rated acceptable.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with copies of soil test results for designated growing area(s) and discuss (E4.8.1).
2. Define and discuss key terms and concepts related to soil conditioners (E4.8.2).
3. Discuss factors to consider when selecting conditioners (E4.8.2, E4.8.3).
4. Have students select conditioners to meet requirements of pH, water-holding capacity, drainage, and fertility (E4.8.3).
5. Demonstrate mixing soil conditioners and discuss procedures (E4.8.4).

SELECTED TOOLS AND MATERIALS

Assorted soil conditioners
Garden tiller
Garden rake
Shovel
Hoe
Wheelbarrow or mixing box
Soil test recommendations
Handout: Instructor-prepared checklist
Worksheets: Nursery worksheets. Hobar.

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Ornamental Horticulture, pp. 127-128, 449-450. McDaniel.
Ornamental Horticulture as a Vocation, pp. 73-108. Moore.
Plant Science, pp. 418-419. Hartmann, Flocker, and Kofranek.

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

4.9 Locate, shape, and form beds

COURSE

Horticulture III (8034)

4.9

PERFORMANCE OBJECTIVE

P4.9 Given a steel tape, stakes, string, wire, other necessary tools or equipment and an area in a shadehouse or open field growing area, locate, shape, and form beds. Space must be allowed for aisles or paths, and beds must be 36 or 42 inches wide and easily accessible for both equipment and labor. The center of each bed must be approximately 2-1/4 inches higher than the sides, with the sides 3 to 5 inches higher than the paths or aisles.

SELECTED ENABLING OBJECTIVES

E4.9.1 Mark off location of beds:
- a. Identify the crop to be grown.
- b. Determine the size of the area to be marked off.
- c. Determine the wheel base and size of the equipment to be used.
- d. Plan the width and layout of the beds according to the size of the equipment and plants to be grown.
- e. Beginning in one corner of the shadehouse or field area, mark off beds, according to the predetermined plan:
  - (1) drive stakes at all four corners of the bed.
  - (2) measure the width of the alleys between beds and mark them with stakes.
  - (3) stretch strong from corners of each bed to mark off beds and indicate alley ways, setting additional intermediate or "in between" stakes for alignment and support, if required.
- f. Return unused stakes and other materials to storage.

E4.9.2 Shape or form beds:
- a. Review specifications for bed.
- b. Shape or form beds, making a trial run to make certain the setting is correct.
- c. Clean equipment and store.

CRITERION-REFERENCED MEASURE

C4.9 Beds located, shaped, and formed; space allowed for aisles or paths, beds 36 to 42 inches wide and accessible for both labor and equipment. Center of each bed approximately 2-1/4 inches higher than sides, with sides 3 to 5 inches higher than the paths or aisles.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Identify the crop to be grown and have students determine the space needed (E4.9.1).
2. Demonstrate and have students mark off location of beds (E4.9.1).
3. Prepare a growing area or shadehouse bed for nursery tree seed propagation, nursery liner production, and/or vegetable or small fruit plantings (E4.9.1, E4.9.2).

SELECTED TOOLS AND MATERIALS

Steel tape
Stakes
String
Wire
Hammer
Wheelbarrow
Shovels
Hoes
Tractor (if large area)
Bed Press (if large area)
Bedding disks

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objectives 16 and 17.
Ornamental Horticulture, pp. 359-360. McDaniel.

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

4.10 Plow land

COURSE

Horticulture III (8034)

4.10

PERFORMANCE OBJECTIVE

P4.10 Given a designated area of land to be plowed, a tractor, and a plow of appropriate size, plow the land. Plowing must be of uniform depth throughout the field, and there must be no skips. Dead furrows must be left to facilitate leveling. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E4.10.1 Explain reasons for plowing to modify soil condition.

E4.10.2 List and follow safety precautions.

E4.10.3 Service the tractor and plow.

E4.10.4 Operate a tractor.

E4.10.5 Hook plow to tractor.

E4.10.6 Adjust the plow to meet the following requirements:
   a. Plow is adjusted to desired depth and share runs parallel to the center line of the tractor.
   b. The landside of the plow is vertical or as nearly vertical as possible.

E4.10.7. Mark off area to be plowed into "land" or areas of size which allow for the best economy in the use of fuel and time.

E4.10.8 Plow the land, beginning at the middle of the selected land and back furrow toward the opening furrow or center line.

E4.10.9 Wash mouldboard and plow shares following use and coat them with oil to prevent rust.

CRITERION-REFERENCED MEASURE

C4.10 Plowed land of uniform depth with no skips; dead furrows left to facilitate leveling, and all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss reasons for plowing, and explain various plowing techniques (E4.10.1-E4.10.9).
2. Emphasize all safety precautions (E4.10.2).
3. Demonstrate with deep containers and small plants the effect of shallow plowing, hardpan, and the bringing of subsoil to the surface with improper plowing (E4.10.1, E4.10.2).
4. Have students demonstrate competency in use and operation of a tractor and plow (E4.10.3).
5. Have students plow land areas for establishing nursery, turf, fruit, or vegetable plantings (E4.10.3-E4.10.9).

SELECTED TOOLS AND MATERIALS

Tractor and plow

SELECTED AUDIOVISUAL MATERIALS

Filmstrips/Cassettes:	Tractor Operation and Safety. Bergwall Productions.
Transparencies:	Plows and Plowing. Ohio Curriculum Materials.

SELECTED REFERENCES

Ornamental Horticulture, pp. 360-361. McDaniel.
Plant Science, pp. 195-197. Hartman, Flocker, and Kofranek.
Tillage (John Deere), pp. 87-89. Ohio Curriculum Materials.
Turfgrass Maintenance Workers. V-TECS. Performance Objective 64.

——— Application ———

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

4.11 Disk land

COURSE

Horticulture III (8034)

4.11

PERFORMANCE OBJECTIVE

P4.11 Given a tractor, land to be disked, and a standard disk harrow, disk the area assigned. Disking will be uniform throughout the field, and the soil will be free of large clods or clumps of sod and left in a level, friable condition. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E4.11.1 Explain purpose of disking.

E4.11.2 Operate a tractor.

E4.11.3 Service the tractor and disk harrow.

E4.11.4 Connect disk to tractor.

E4.11.5 Adjust the disk to the proper cutting angle and depth depending upon condition of the land.

E4.11.6 Double-disk the land, making certain that overlap is half the width of disk.

E4.11.7 Store unit under shelter, following coating of disks with oil.

E4.11.8 Outline all safety procedures and relate to task.

CRITERION-REFERENCED MEASURE

C4.11 Disking of land uniform with soil free of large clods or clumps, and left in level, friable condition; all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students review reasons for plowing and relate to purposes of disking (E4.11.1).
2. Illustrate effects of insufficient tillage (cloddiness) or excessive tillage (crusting) on seeding and plant growth (E4.11.1).
3. Have students demonstrate competency in operation of a tractor (E4.11.2).
4. Have students disk plowed or previously planted land needing only shallow tillage in preparation for nursery, turf, fruit, or vegetable plantings (E4.11.2-E4.11.7).
5. Review and emphasize all safety procedures (E4.11.8).

SELECTED TOOLS AND MATERIALS

Tractor and disk

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Tractor Operation and Safety. Bergall Productions.

SELECTED REFERENCES

Ornamental Horticulture, pp. 360-361. McDaniel.
Plant Science, p. 197. Hartman, Flocker, and Kofranek.
Tillage (John Deere), pp. 157-160. Ohio Curriculum Materials.
Turfgrass Maintenance Workers. V-TECS. Performance Objective 64.

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

4.12 Apply and mix fertilizers into soil beds

COURSE

Horticulture III (8034)

4.12

PERFORMANCE OBJECTIVE

P4.12 Given a field area or greenhouse bed to be planted, granular fertilizer, a suitable applicator, and a rotary tiller or other incorporation equipment, apply and mix the fertilizer into the soil. Fertilizer will be applied and mixed uniformly at the rate and depth prescribed by the instructor and in such a way that chemical analysis of any random samples that could be taken would be approximately the same. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E4.12.1 List and describe functions of major fertilizer components.

E4.12.2 List various forms of fertilizers and give advantages and disadvantages of each--include granular, slow release, liquid, organic, and soluble.

E4.12.3 Explain interpretation of soil test report and determination of fertilizer requirements.

E4.12.4 Apply fertilizer by hand.

E4.12.5 Calibrate applicator, according to the needed application rate of the fertilizer to be used.

E4.12.6 Apply fertilizer with the applicator.

E4.12.7 Disk, till, or otherwise mix the fertilizer into the soil. Follow all safety precautions.

E4.12.8 Wash and treat applicator with oil prior to storage.

CRITERION-REFERENCED MEASURE

C4.12 Fertilizer applied and mixed into soil beds; fertilizer applied and mixed uniformly at rate and depth prescribed by instructor. Random samples of soil reveal chemical analysis approximately the same. All safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss uses, composition, and characteristics of different types of fertilizers (E4.12.1, E4.12.2).
2. Demonstrate how to use soil test reports to determine fertilizer requirements (E4.12.3).
3. Have students fertilize previously used soilless media and cut flower beds (E4.12.4-E4.12.8).
4. Demonstrate calibration and operation of different spreaders (drop and broadcast, hand-carried, and wheeled) (E4.12.5).
5. Have students practice hand application of fertilizer in buckets spread over an open area to reveal uniformity of application. Compare with various spreaders (E4.12.4).
6. Have students fertilize nursery, turf, and garden plots in preparation for planting (E4.12.4-E4.12.8).

SELECTED TOOLS AND MATERIALS

Fertilizer spreaders
  (drop, broadcast, hand-carried, and wheeled)
Fertilizer specification from soil test
Fertilizer (granular, slow release, liquid,
  organic, and soluble)
Plot of land
Small tractor
Rake
Hoe
Shovel
Bucket
Old oil

SELECTED AUDIOVISUAL MATERIALS

Filmstrips/Cassettes: Fertilizers and Soil Fertility Series. Teaching Aids, Inc.
Identifying Fertilizer Ingredients. Singer Career Systems.
Transparencies: "Fertilizer and pH," Illustrated Horticulture. F-11, F-13.

SELECTED REFERENCES

The Commercial Greenhouse, pp. 174-187. Boodley.
Floriculture Worker. V-TECS. Performance Objective 46.
Gardening-Groundskeeping. V-TECS. Performance Objective 86.
Interpreting a Fertilizer Analysis. Learning Activity Package in Horticulture. VPI & SU.
Nursery Production. V-TECS. Performance Objectives 28 and 29.
Turfgrass Maintenance Workers. V-TECS. Performance Objectives 8 and 9.

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

TASK / COMPETENCY

4.13 Till soil with hand tools

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

4.13

PERFORMANCE OBJECTIVE

P4.13 Given an area of uncultivated land to be tilled and the necessary hand tools and equipment, till soil with hand tools in preparation for planting. The soil should be tilled to an average depth of 8-10 inches to a medium tilth. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E4.13.1 Identify hand tools used for digging and tilling soil.

E4.13.2 Define and outline the procedures for double-digging.

E4.13.3 Use necessary hand tools and equipment.

CRITERION-REFERENCED MEASURE

C4.13 Soil tilled to a medium tilth to a depth of 8-10 inches, and all safety procedures observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss and explain double-digging (E4.13.2).
2. Demonstrate use of appropriate hand tools (E4.13.1).
3. Have students prepare a small soil area for a border planting or within a raised planter that is too small for power tillage equipment (E4.13.1-E4.13.3).

SELECTED TOOLS AND MATERIALS

Garden rake
Round-nosed shovel
Spade
Spading fork

SELECTED AUDIOVISUAL MATERIALS

Transparency: "Planting and Maintenance," Illustrated Horticulture. PM-51.

SELECTED REFERENCES

None identified

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

TASK / COMPETENCY

4.14 Till soil with power tools

Application

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

4.14

PERFORMANCE OBJECTIVE

P4.14 Given the necessary equipment and operating instructions, till a 100 square foot plot of soil for planting a designated crop. The soil should be tilled an average of 6 inches deep and to a medium tilth. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E4.14.1 Explain safety precautions.

E4.14.2 Service a rotary tiller.

E4.14.3 Adjust depth control mechanism on rotary tiller.

E4.14.4 Determine starting point and direction of travel.

E4.14.5 Engage rotors by adjusting belt or chain levers.

E4.14.6 Lower rotors at starting point.

E4.14.7 Set trottle at 3/4 speed and allow tiller to set travel speed.

E4.14.8 Clean and store the rotary tiller.

CRITERION-REFERENCED MEASURE

C4.14 Soil tilled to an average of 6 inches deep and to a medium tilth with all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Explain uses of a rotary tiller (E4.14.1).
2. Service, set up, and safely operate a rotary tiller (E4.14.2-E4.14.8).
3. Have students prepare a 100 square foot soil area for planting flower bed or nursery, turf, fruit, or vegetable plots (E4.14.2-E4.14.8).

SELECTED TOOLS AND MATERIALS

Garden rake
Rotary tiller
Shovel
Spade
Equipment operating instructions

SELECTED AUDIOVISUAL MATERIALS

Slides/Cassette: For Safety's Sake. Outdoor Power Equipment Institute.

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 117 and 82.
Grounds Keeping Equipment Volume 1. Operating Tractors, Ground Keeping, and Ornamental Horticulture. AAVIM.

Application

DUTY AREA

4. PREPARING AND IMPROVING SOIL AND GROWING MEDIA

TASK / COMPETENCY

4.15 Analyze soil samples to determine soluble salts content

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

4.15

PERFORMANCE OBJECTIVE

P4.15 Given the necessary supplies and equipment, analyze soil samples to determine soluble salts content. Readings must vary no more than ± 5% from a prepared and predetermined sodium standard solution.

SELECTED ENABLING OBJECTIVES

E4.15.1 Explain sources and effects of soluble salts in soil.

E4.15.2 Place portion of well mixed soil sample in mixing containers.

E4.15.3 Add distilled water (or water of known conductivity). Use 2:1 ratio for soil, 5:1 for soilless mixes or just to reach soil saturation for saturated paste technique (requires vacuum cultivation equipment).

E4.15.4 Let soil and water mixture stand 30 minutes.

E4.15.5 Place electrodes from bridge in top water portion of mixture.

E4.15.6 Take reading.

E4.15.7 Convert reading to soluble salts level.

E4.15.8 Explain how to clean Solu-bridge and store in accordance with manufacturer's specifications.

CRITERION-REFERENCED MEASURE

C4.15 Soluble salts content determined by analyzing soil samples. Readings vary no more than ±5% from a prepared and predetermined sodium standard solution.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate fertilizer effect on soluble salt measurement with pure water and one or more concentrations of fertilizer (E4.15.1).
2. Demonstrate effects of soluble salts on plant growth by proper and excessive fertilization of selected plants (E4.15.1).
3. Have students analyze soil soluble salts level of greenhouse crops (E4.15.2-E4.15.8).

SELECTED TOOLS AND MATERIALS

Solu-bridge and interpretation chart
Quart mixing jar
Distilled water

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, pp. 191-194. Boodley.
Soil Testing and Fertilization. Ohio Curriculum Materials.

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

TASKS/COMPETENCIES

5.1 Plant seeds

5.2 Transplant seedlings

5.3 Take softwood and semi-hardwood cuttings

5.4 Take hardwood cuttings

5.5 Apply rooting hormone

5.6 Root cuttings in media

5.7 Label plants or cuttings

5.8 Transplant rooted cuttings into pots or beds

5.9 Transplant liners to field

5.10 Make leaf cuttings

5.11 Make layered cuttings

5.12 Make rhizome cuttings

5.13 Divide roots, crowns, and tubers

5.14 Graft and bud plants

5.15 Treat seeds

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

5.1 Plant seeds

COURSE

Horticulture III (8034)

5.1

PERFORMANCE OBJECTIVE

P5.1 Given seeds to be planted and the necessary equipment and supplies, plant the seed. The seed must be planted at the recommended depth and time according to planting chart.

SELECTED ENABLING OBJECTIVES

E5.1.1 List factors involved in germination of seeds.

E5.1.2 Perform the following procedural steps:
- a. Identify the seeds to be planted.
- b. Fill flats or containers with germination medium or work up soil bed to a uniform, fine texture.
- c. Mark rows in flats, open holes in containers, or make furrows in soil bed.
- d. Place the seeds in the holes or furrows.
- e. Cover to the proper depth.
- f. Label all containers, flats, or rows in the field bed.
- g. Place containers in suitable area to germinate.
- h. Keep medium in containers or soil in field beds.
- i. Return cleaned equipment and unused materials to proper storage.

CRITERION-REFERENCED MEASURE

C5.1 Seeds planted at correct depth and time in accordance with planting chart.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students prepare and present reports on the environmental effects on seed germination (E5.1.1).
2. Have students prepare seed collections (E5.1.1).
3. Discuss the treatment of seeds to overcome dormancy prior to planting (E5.1.1).
4. Have students plant bedding plant seed cut flower seed, and pot plant seed, using both seed flats and individual containers (E5..2).

SELECTED TOOLS AND MATERIALS

Flats, peat, and plastic pots
Heat cables or propagation mat (optional)
Labels
Marking pencil or pen
Mist system, or glass, or polyethylene cover
Row marker or dibble
Ruler
Planting chart

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette:	Planting. Teaching Aids.
Transparency:	"Plant Propagation," Illustrated Horticulture. P-9, P-11, P-13, P-17.

SELECTED REFERENCES

The Complete Book of Growing Plants From Seeds. Haring.
Floriculture Worker. V-TECS. Performance Objective 20.
Nursery Production. V-TECS. Performance Objective 18.
Ornamental Horticulture, pp. 119-122. McDaniel.
Sowing Seed Indoors. Learning Activity Package in Horticulture. VPI & SU.
Turfgrass Maintenance Workers. V-TECS. Performance Objective 66.

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

5.2 Transplant seedlings

COURSE

Horticulture III (8034)

5.2

PERFORMANCE OBJECTIVE

P5.2 Given a flat of seedlings to be transplanted, the necessary tools and equipment, and designated growing containers or area, transplant the seedlings. All items on instructor-prepared checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E5.2.1 Demonstrate the following sequenced job skills for transplanting seedlings into containers:

a. Small-rooted seedlings:
   1. Fill container with medium.
   2. Open planting hole with finger or dibble.
   3. Handle seedlings by one leaf to prevent injury, and carefully place in hole at proper depth.
   4. Carefully firm soil around roots.
   5. Water transplants to finish firming medium around roots.

b. Large-rooted seedlings or cuttings:
   1. Partially fill container with medium.
   2. Place plant in container and hold while adding more medium over roots.
   3. Carefully firm medium with fingers or by bumping containers on table.

E5.2.2 Demonstrate the following sequenced job skills for transplanting seedlings to field or greenhouse beds:

a. Mark off planting spaces with stakes and string or with bedwire.
b. Open planting holes with dibble, hand, or trowel.
c. Place transplant at proper depth in hole.
d. Hold plant while placing soil or medium around roots.
e. Carefully firm soil with hands.
f. Water the plants.

E5.2.3 Clean equipment and return to proper storage.

CRITERION-REFERENCED MEASURE

C5.2 Seedlings transplanted with all items rated acceptable on instructor-prepared checklist.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate the proper method to handle seedling when transplanting (E5.2.1).
2. Review study of soil media (E5.2.1).
3. Review study of marking off areas to plant (E5.2.2).
4. Have students practice transplanting rooted herbaceous and woody cuttings into containers (E5.2.1).
5. Have students practice transplanting vegetable or small fruit plants to garden plots (E5.2.2).
6. Arrange for class to visit a greenhouse, nursery, or vegetable/small fruit farm to observe transplanting (E5.2.1-E5.2.3).

SELECTED TOOLS AND MATERIALS

Dibble sticks
Flats
Growing media
Hoe
Labels
Market paks
Seedlings
Trowel
Handout: Instructor-prepared checklist

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Planting. Teaching Aids.

SELECTED REFERENCES

Flower and Plant Production in the Greenhouse, pp. 232-235. Nelson.
Horticulture: A Basic Awareness, p. 51. Baudendistel.
Nursery Production. V-TECS. Performance Objective 23.
Ornamental Horticulture, pp. 122-123, 359-362. McDaniel.
Plant Propagation, Principles, and Practices, pp. 190-192. Hartman and Kester.

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

5.3 Take softwood and semi-hardwood cuttings

COURSE

Horticulture III (8034)

5.3

PERFORMANCE OBJECTIVE

P5.3 Given pruning shears and/or knife, container, and stock plants to use for cuttings, take softwood and semi-hardwood cuttings. Cuttings must be taken from current terminal wood, the cut must be made at a 45° angle, and cuttings must be 3-5 inches in length depending on kind of plant. All cuttings must be free from disease, broken stems, and damage, and all safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E5.3.1 Identify basic parts of a plant.

E5.3.2 Identify types of cuttings.

E5.3.3 Explain the reasons for propagating by cuttage.

E5.3.4 Identify characteristics of healthy, vigorous plants from which cuttings are to be taken.

E5.3.5 Demonstrate how to use small pair of shears or knife and collect cuttings in a suitable container.

E5.3.6 Label cuttings.

E5.3.7 Clean and return all equipment to storage.

CRITERION-REFERENCED MEASURE

C5.3 Softwood and hardwood cuttings taken from terminal wood with the cut made at 45° angle, cuttings 3-5 inches in length depending on plant type, and free from disease, broken stems, and damage. All safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss parts of a plant and reasons for propagation by cutting, displaying samples of different types of cuttings (E5.3.1-E5.3.3).
2. Have students list characteristics of healthy plants (E5.3.4).
3. Have students practice taking softwood and semi-hardwood cuttings (E5.3.5-E5.3.7).

SELECTED TOOLS AND MATERIALS

Horticultural knife
Labels
Waterproof pen
Plastic bags or bucket
Pruning shears
Stock plants

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Cuttings and Divisions. Teaching Aids.
Propagating Ornamental Plants. Vocational Education Productions.
Transparency: "Plant Propagation," Illustrated Horticulture. P-17, P-19, P-21, P-23, P-25.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 24.
Flower and Plant Production in the Greenhouse, pp. 112-123. Nelson.
Introductory Horticulture, pp. 96-103. Reiley and Shry.
Nursery Production. V-TECS. Performance Objective 22.
Plant Propagation, Principles, and Practices, pp. 298-316. Hartmann and Kester.
Working in Horticulture, pp. 119-121. Richardson and Moore.

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

5.4 Take hardwood cuttings

COURSE

Horticulture III (8034)

5.4

PERFORMANCE OBJECTIVE

P5.4 Given pruning shears and/or knife, container, and dormant trees, take hardwood cuttings. Cuttings will be a length suitable for the kind of plant and must be free from disease, broken stems, or other damage. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E5.4.1 Define: dormant, deciduous, evergreen, hardwood, softwood, and node.

E5.4.2 List at least five trees/shrubs which are commonly propagated by hardwood cuttings.

E5.4.3 Identify characteristics of healthy, vigorous plants from which cuttings can be taken.

E5.4.4 Use pruning shears or knife to take cuttings.

E5.4.5 Label cuttings.

E5.4.6 Clean and return equipment to storage.

CRITERION-REFERENCED MEASURE

C5.4 Hardwood cuttings taken with length suitable for plant variety and cutting free from disease, broken stems, and damage. All safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Define and discuss dormant, deciduous, evergreen, hardwood, softwood, and node (E5.4.1).
2. Discuss characteristics and properties of trees and shrubs usually propagated by hardwood cuttings, and have students work in small groups to devise lists of plants which would fall into this category (E5.4.2).
3. Arrange for students to visit a nursery and have them identify suitable sources for hardwood cuttings, and explain where on each plant they would take the cutting and why (E5.4.2, E5.4.3).
4. Have students practice taking hardwood cuttings, using pruning shears or knife (E5.4.4-E5.4.6).

SELECTED TOOLS AND MATERIALS

Horticultural knife
Labels
Waterproof pen
Plastic bags or container for cuttings
Pruning shears
Stock plants

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette:	Cutting and Divisions. Teaching Aids.
Transparency:	"Plant Propagation," Illustrated Horticulture. P-17, P-19, P-21, P-27.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 24.
Introductory Horticulture, pp. 112-115. Reiley and Shry.
Plant Propagation, Principles, and Practices, pp. 300-306. Hartmann and Kester.
Working in Horticulture, p. 121. Richardson and Moore.

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

TASK / COMPETENCY

5.5 Apply rooting hormone

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

5.5

PERFORMANCE OBJECTIVE

P5.5 Given cuttings ready to be treated with hormone and the necessary equipment and supplies, apply rooting hormone to the cuttings. The rooting ends of the cuttings must be uniformly coated with the hormone.

SELECTED ENABLING OBJECTIVES

E5.5.1 Identify types of rooting hormones.

E5.5.2 Identify factors to consider in selecting hormones for treating cuttings.

E5.5.3 Select proper rooting hormone to apply to cutting.

E5.5.4 Place small amount of hormone into container.

E5.5.5 Place cut ends of 12-15 cuttings into the hormone.

E5.5.6 Remove surplus hormone from cuttings.

E5.5.7 Stick cuttings in rooting media.

E5.5.8 Water thoroughly.

CRITERION-REFERENCED MEASURE

C5.5 Rooting hormone applied uniformly over rooting ends.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display and discuss samples of rooting hormones and cuttings suitable for rooting with hormones (E5.5.1).
2. Discuss selection factors such as maturity of wood, strength of hormone, type of desired propagation, and temperature control requirement (E5.5.2).
3. Have students select appropriate rooting hormone for designated cuttings (E5.5.3).
4. Have students apply rooting hormone to various kinds of cuttings (E5.5.4-E5.5.8).

SELECTED TOOLS AND MATERIALS

Rooting hormone powder
Soft brush or duster
Softwood and hardwood cuttings

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Cutting and Divisions. Teaching Aids.
Transparency: "Plant Propagation," Illustrated Horticulture. P-29.

SELECTED REFERENCES

The Commercial Greenhouse, pp. 241-242. Boodley.
Introductory Horticulture, pp. 49-50. Reiley and Shry.
Nursery Production. V-TECS. Performance Objective 11.

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

5.6 Root cuttings in media

COURSE

Horticulture III (8034)

5.6

PERFORMANCE OBJECTIVE

P5.6 Given hardwood cuttings, softwood cuttings, and evergreen hardwood cuttings, fungicidal dip, rooting areas, prepared beds or pots with rooting medium, root the cuttings. The hardwood cuttings must be placed deep enough so that only one bud shows above the soil, and cuttings should be planted 6 to 8 inches apart in rows wide enough for easy cultivation. The lower 1/3 to 1/2 of the leaves of the softwood and evergreen hardwood cuttings must be removed, the base of each cutting must be dipped in hormone and stuck 1/3 of its length in the rooting medium, and cuttings must be spaced so that the leaves barely overlap.

SELECTED ENABLING OBJECTIVES

E5.6.1 Demonstrate how cuttings are prepared for sticking with the following practices (where appropriate):
   a. Strip lower foliage from stem area to be placed in rooting medium.
   b. Treat cut end by means of a fungicidal dip.
   c. Wound cut end.
   d. Treat cut end with a liquid or powder rooting hormone.
   e. Reduce leaf area of cutting to decrease water loss.

E5.6.2 Explain the importance of spacing the cuttings according to type requirements and inserting the cuttings into medium at a depth of 1 inch.

E5.6.3 Describe how to firm up the medium around each cutting to ensure good contact with the soil.

E5.6.4 Irrigate cutting immediately after planting.

E5.6.5 Demonstrate operation and regulation of the mist system.

E5.6.6 Demonstrate operation and regulation of the heat cables or mats.

E5.6.7 Clean and return all equipment and materials to storage.

CRITERION-REFERENCED MEASURE

C5.6 Hardwood cuttings placed deep enough so that only one bud shows above soil, planted 6 to 8 inches apart in rows wide enough for easy cultivation. Softwood and evergreen hardwood cuttings have the lower 1/2 to 1/3 of the leaves removed, base of each cutting dipped in hormone, stuck 1/3 of its length in rooting medium, and spaced so that leaves barely overlap.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review study of rooting hormones, types, and application (E5.6.1).
2. Discuss preparation of cutting for planting into medium (E5.6.1).
3. Discuss spacing and results of improper spacing (E5.6.2).
4. Have students practice rooting cuttings (E5.6.1-E5.6.7).

SELECTED TOOLS AND MATERIALS

Cuttings (hardwood, softwood, and evergreen)
Fungicidal dip
Labels
Prepared bed, flats, or pots
Rooting hormone powder

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette:	Cutting and Divisions. Teaching Aids.
Transparency:	"Plant Propagation," Illustrated Horticulture. P-31.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 25.
Nursery Production. V-TECS. Performance Objectives 16 and 17.
Plant Propagation, Principles, and Practices, pp. 257-282. Hartmann and Kester.

Application

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

5.7 Label plants or cuttings

COURSE

Horticulture III (8034)

5.7

PERFORMANCE OBJECTIVE

P5.7 Given cuttings or plants in flats and the required labels, label the cuttings or plants. Writing on all labels must be clear and legible. Plants must be arranged in back of and to the right of the labels. Labels on flowering plants must also include color.

SELECTED ENABLING OBJECTIVES

E5.7.1 Identify plants to be labeled.

E5.7.2 Select and secure type of label and marker to be used.

E5.7.3 Print name of plant on label. Include color of bloom on annuals, perennials, and biennials.

E5.7.4 Place labels on flats, packs, pots, or trays.

E5.7.5 Arrange colors, varieties, and species of plants.

E5.7.6 Check all labels to assure correct placement.

CRITERION-REFERENCED MEASURE

C5.7 Plants or cuttings labeled with writing clear and legible; plants arranged in back of and to the right of labels. Color included on the labels of flowering plants.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students practice printing on labels (E5.7.3).
2. Have students label the plant identification collection in the greenhouse (E5.7.1-E5.7.6).
3. Arrange for students to visit a local nursery or greenhouse to view labeling and arranging of plants (E5.7.3-E5.7.5).
4. Have students discuss possible results of incorrectly labeling or misplacing plants (E5.7.6).

SELECTED TOOLS AND MATERIALS

Waterproof marking or nursery pen
Wooden and plastic labels

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 28.
Introductory Horticulture, pp. 103-104. Reiley and Shry.
Nursery Production. V-TECS. Performance Objective 14.

— Application —

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

5.8 Transplant rooted cuttings into pots or beds

COURSE

Horticulture III (8034)

5.8

PERFORMANCE OBJECTIVE

P5.8 Given a rooting bed or flat filled with rooted tip cuttings, potting soil, containers, and the necessary supplies and equipment, remove 25 of the rooted cuttings by hand and transplant rooted cuttings as directed. No unnecessary damage to roots or foliage must be caused, transplanting containers must be filled approximately two-thirds full with potting soil mixture, roots of plants must be placed on top of the soil and more soil added to cover the roots, and soil should then be firmed around the roots.

SELECTED ENABLING OBJECTIVES

E5.8.1 Identify types of root systems and growth irregularities.

E5.8.2 Demonstrate how to remove a cutting without damaging it by inserting the hand under the rooted cutting and lifting it out of the bed or flat in which it has been rooted.

E5.8.3 Explain the importance of placing cutting in a container large enough to prevent damage to the plant and in which the cutting can be kept moist.

E5.8.4 Firm the soil after setting the cutting.

E5.8.5 Water thoroughly.

E5.8.6 Clean the equipment and work area.

CRITERION-REFERENCED MEASURE

C5.8 Rooted cuttings transplanted; roots and foliage of cutting undamaged, containers filled two-thirds full with potting soil mixture, roots of plants placed on top of soil and additional soil added to cover roots, soil firmed around roots.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with examples of various types of root systems (E5.8.1).
2. Have students observe callus growth on cuttings (E5.8.1).
3. Provide a demonstration on how to transplant rooted cuttings (E5.8.2-E5.8.6).
4. Have students practice removing rooted cuttings from rooting bed or flat and placing them in containers (E5.8.1-E5.8.6).

SELECTED TOOLS AND MATERIALS

Containers
Flat of rooted cuttings
Growing media
Labels
Lifting tools
Pencil

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette:	Cuttings and Divisions. Teaching Aids.
Transparency:	"Plant Propagation," Illustrated Horticulture. P-33, P-35.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objectives 22 and 26.
Plant Propagation, Principles, and Practices, pp. 257-282. Hartmann and Kester.

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

5.9 Transplant liners to field

COURSE

Horticulture III (8034)

5.9

PERFORMANCE OBJECTIVE

P5.9 Given liners to be transplanted to the field and necessary equipment and supplies, transplant the liners to the field. All plants must be upright and watered, and all roots must be covered. The soil must be packed firmly around each plant.

SELECTED ENABLING OBJECTIVES

E5.9.1 Prepare soil for planting as required.

E5.9.2 Treat field with pre-emergent grass and weed control chemicals as required.

E5.9.3 Lay off field in rows.

E5.9.4 Open furrow in rows.

E5.9.5 Place liners in rows.

E5.9.6 Close furrows around liners.

E5.9.7 Water or irrigate liners.

E5.9.8 Treat field with post-emergent grass and weed control chemicals as required.

CRITERION-REFERENCED MEASURE

C5.9 Liners transplanted; all plants upright, watered, and all roots covered with soil packed firmly around each plant.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review soil preparation techniques (E5.9.1).
2. Discuss advantages and disadvantages of pre-emergent and post-emergent grass and weed chemical controls (E5.9.2, E5.9.8).
3. Review field preparations techniques (E5.9.3, E5.9.4).
4. Demonstrate how to transplant liners (E5.9.5-E5.9.7).
5. Have students practice transplanting liners (E5.9.1-E5.9.8).

SELECTED TOOLS AND MATERIALS

Liners
Trowels
Worksheets: Nursery worksheets. Hobar.

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Nursery Production. V-TECS. Performance Objective 24.
Introductory Horticulture, pp. 115-118. Reiley and Shry.
Ornamental Horticulture, pp. 361-362. McDaniel.

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

TASK / COMPETENCY

5.10 Make leaf cuttings

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

5.10

PERFORMANCE OBJECTIVE

P5.10 Given pruning shears and/or knife, container, and stock plants from which cuttings are to be taken, make leaf cuttings. Leaf cuttings must be free from disease, insects, and damage. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E5.10.1 List five foliage plants which may be propagated by leaf cuttings.

E5.10.2 Label parts of a leaf on drawing provided by instructor.

E5.10.3 Outline steps in making a leaf cutting.

CRITERION-REFERENCED MEASURE

C5.10 Leaf cuttings made with cuttings free from disease, insects, and damage, and all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss characteristics of plants propagated by leaf cuttings, and identify plants in the greenhouse and local surroundings which can be propagated this way (E5.10.1).

2. Have students make leaf cuttings of selected plants, using several leaf cutting types, including: a) leaf with petiole, b) leaf without petiole, c) leaf in triangular sections, d) leaf in horizontal sections, and e) leaf with veins severed and placed flat on media (E5.10.2, E5.10.3).

SELECTED TOOLS AND MATERIALS

Plastic bags or a container
Pruning shears or knife
Stock plants
Florist wire or hair pins
Rooting powder
Drawing of leaf

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette:	Cuttings and Divisions. Teaching Aids.
Transparency:	"Plant Propagation," Illustrated Horticulture. P-19.

SELECTED REFERENCES

The Commercial Greenhouse, pp. 240-241. Boodley.
Horticulture: A Basic Awareness, pp. 51-53. Baudendistel.
Introductory Horticulture, p. 108. Reiley and Shry.
Plant Propagation, Principles, and Practices, pp. 242-243, 311-314. Hartmann and Kester.
Working in Horticulture, pp. 121-122. Richardson and Moore.

— Application —

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

TASK / COMPETENCY

5.11 Make layered cuttings

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

5.11

PERFORMANCE OBJECTIVE

P5.11 Given a plant that may be layered and appropriate tools and supplies, make layered cuttings. The plant must be wounded and treated in such a way that roots successfully develop. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E5.11.1 Explain the reasons for using layerings.

E5.11.2 Identify plants to be layered.

E5.11.3 Demonstrate the following sequenced job skills:

a. Wound the plant by cutting the stem about half through just below the one or more nodes where rooting is desired.
b. Wedge the wounding cut open with a small piece of wood.
c. Treat the wound area with rooting hormone, if needed.
d. Cover the stem with soil and secure it (simple, trench, or tip layerage) or wrap wound area with moist sphagnum and plastic film (air layerage).
e. Clean work area and tools and return equipment to storage.

CRITERION-REFERENCED MEASURE

C5.11 Layered cuttings made with plant wounded and treated in such a way that roots successfully develop, and all safety procedures observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Explain and demonstrate layering processes (E5.11.1-E5.11.3).
2. Display samples or illustrations of plants that can be propagated by layering (E5.11.2).
3. Have students perform the following activities (E5.11.3):
    a. Air layer a rubber plant or draceana.
    b. Trench layer a rhododendron and compare rooting speed and success with regular cuttings.
    c. Use tip and trench layerage to propagate plants such as grape, black raspberry, philodendron, or ornamental shrubs with slender stems.
    d. Use mound (stool) layerage.

SELECTED TOOLS AND MATERIALS

Hook wires
Knife
Plastic film
Rooting hormone
Rooting medium
Shovel
Spade, round-nosed
Sphagnum
Stock plants
Twist-ties

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Cuttings and Divisions. Teaching Aids.
Transparency: "Plant Propagation," Illustrated Horticulture. P-57, P-59, P-61, P-63, P-65.

SELECTED REFERENCES

The Commercial Greenhouse, pp. 249-250. Boodley.
Horticulture: A Basic Awareness, pp. 53-55. Baudendistel.
Introductory Horticulture, pp. 149-157. Richardson and Moore.
Plant Propagation, Principles, and Practices, pp. 472-490. Hartmann and Kester.

Application

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

TASK/COMPETENCY

5.12 Make rhizome cuttings

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

5.12

PERFORMANCE OBJECTIVE

P5.12 Given rhizomatous plants, a knife, and other necessary tools and supplies, make rhizome cuttings. Each cutting must have at least one eye or node. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E5.12.1 Identify and describe rhizome, corm, stolon, runner, and bulb.

E5.12.2 Identify 10-12 foliage plants, and state the common method of propagating each.

E5.12.3 Outline steps in making a rhizomatous cutting.

CRITERION-REFERENCED MEASURE

C5.12 Rhizome cuttings made with each cutting having at least one eye or node, and all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students define rhizone, corm, stolon, runner, and bulb (E5.12.1).
2. Provide students with a list of common rhizomatous-type plants for them to determine the type of vegetative propagate formed and how and when the plants are propagated (E5.12.2, E5.12.3).

SELECTED TOOLS AND MATERIALS

Horticultural knife
Sansevieria, Iris, or other rhizomatous plants

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette:	Cuttings and Divisions. Teaching Aids.
Transparency:	"Plant Propagation," Illustrated Horticulture. P-47.

SELECTED REFERENCES

The Commercial Greenhouse, p. 248. Boodley.
Introductory Horticulture, pp. 124-125. Reiley and Shry.
Identifying Different Types of Bulbs. Learning Activity Package in Horticulture. VPI & SU.
Plant Propagation, Principles, and Practices, pp. 504-507. Hartmann and Kester.
Working in Horticulture, pp. 124-125. Richardson and Moore.

Application

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

5.13 Divide roots, crowns, and tubers

COURSE

Horticulture III (8034)

5.13

PERFORMANCE OBJECTIVE

P5.13 Given a knife and/or shovel or spade and appropriate plants, divide roots, crowns, and tubers. Divisions will be free of diseased or damaged parts and of sufficient size to develop into a new plant. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E5.13.1 Identify plants that can be propagated by division.

E5.13.2 Describe plant growth forms such as crowns, offsets, suckers, or stolons that allow successful division.

E5.13.3 Perform the following sequenced job skills:
- a. Remove the plant to be divided from its container or bed.
- b. Use a knife, spade, or the hand to divide the large plant mass into single stems or small clumps.
- c. Check each division to be sure it has healthy leaves, stems, buds, and/or roots.
- d. Plant the healthy divisions into new containers or growing media.
- e. Clean and return tools to storage.

CRITERION-REFERENCED MEASURE

C5.13 Plants divided with each division healthy, undamaged, and of sufficient size for new plant to develop. All safety procedures observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display samples or illustrations of plants that can be propagated through divisions (E5.13.1, E5.13.2).
2. Have students do the following (E5.13.3):
   a. Divide Boston ferns and garden perennials (crowns).
   b. Divide bulbs and Africian violets (offsets).
   c. Divide spider plant, pacasandra, bugle, and strawberry (stolons and rhizomes - natural layerage).
   d. Divide red raspberry (suckers).
3. Show and discuss filmstrip Plant Propagating Series (E5.13.1, E5.13.2).

SELECTED TOOLS AND MATERIALS

Spade
Knife

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette:	Plant Propagating Series. Teaching Aids.
Transparency:	"Plant Propagation," Illustrated Horticulture. P-37, P-39, P-41, P-49.

SELECTED REFERENCES

The Commercial Greenhouse, pp. 247-248. Boodley.
Introductory Horticulture, pp. 125-126. Reiley and Shry.
Plant Propagation, Principles, and Practices, pp. 507-512. Hartmann and Kester.

Application

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

5.14 Graft and bud plants

COURSE

Horticulture III (8034)

5.14

PERFORMANCE OBJECTIVE

P5.14 Given stock plants to be either grafted or budded, compatible scions or bud sticks, and the necessary tools and supplies, graft and bud the plants. The grafted or budded parts must be properly cut, inserted, secured, and sealed so that growth occurs from the scion. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E5.14.1 Explain factors required for successful grafting and budding.
E5.14.2 Identify plants to be grafted or budded, denoting which are stock and scion plants.
E5.14.3 Demonstrate the following sequenced job skills:

- a. Whip-and-tongue graft:
  1. Make a long slanting cut on stem of stock plant where graft is to be made.
  2. Select scion of same stem diameter as stock and make cut at same angle as on stock.
  3. Make vertical cut in center of both stock and scion stems perpendicular to direction of initial slanting cut.
  4. Slide stock and scion parts together lining up both combined areas.
  5. Secure the graft with rubber strips and seal with grafting wax.
  6. Rub on cut off buds on the stock plant.
- b. T-budding:
  1. Make a one inch long vertical cut through bark of the stock stem and then a horizontal cut at the top to make a "T."
  2. Cut vertically under the selected bud, stopping about one inch above the bud.
  3. Remove bud piece with a horizontal cut above the bud piece (shaped like a shield).
  4. Open bark flaps and slide in the bud piece.
  5. Secure bud with rubber strip.
  6. Prune and remove other buds from stock plant.
- c. Clean and store equipment.

CRITERION-REFERENCED MEASURE

C5.14 Plants grafted and budded with parts properly cut, inserted, secured, and sealed so that growth occurs from the scion. All safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display samples or illustrations of plants suitable for budding or grafting. Distinguish between stock and scion plants and outline steps for different grafting and budding procedures (E5.14.1-E5.14.3).

2. Have students do the following (E5.14.3):
    a. Practice bench grafting with stem pieces of shrubby dogwood or other small, solid-stem woody plants. Graft types can include whip-and-tongue, simple, and saddle.
    b. Top-work an apple tree, using cleft grafts.
    c. Use side or veneer grafts to propagate a blue spruce on a Colorado spruce stock.
    d. Practice budding with selected rose cultivars, pink dogwood on seedling stocks, apple cultivars on seedling stocks, or other plants as available.

SELECTED TOOLS AND MATERIALS

Grafting/budding knives
Rubber bud strips
Grafting wax
Rootstock and scion wood
Labels
Marking pen

SELECTED AUDIOVISUAL MATERIALS

Filmstrips/Cassettes: Techniques of Budding and Grafting. Vocational Education Productions.
Transparencies: "Plant Propagation," Illustrated Horticulture. P-67, P-69, P-73, P-77, P-79, P-81, P-83, P-83, P-87, P-89, P-91, P-93, P-95, P-97, P-99, P-101, P-103.

SELECTED REFERENCES

Introductory Horticulture, pp. 130-148. Reiley and Shry.
Ornamental Horticulture, pp. 351-355. McDaniel.
Plant Propagation, Principles, and Practices, pp. 343-471. Hartmann and Kester.
Working in Horticulture, pp. 124-127. Richardson and Moore.

DUTY AREA

5. PROPAGATING SEEDS, CUTTINGS, AND PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

5.15 Treat seeds

COURSE

Horticulture III (8034)

5.15

PERFORMANCE OBJECTIVE

P5.15 Given seeds needing treatment and necessary equipment and supplies, treat the seeds. The seeds must be cleaned and treated in such a way that the embryo is not injured and germination inhibitors are removed.

SELECTED ENABLING OBJECTIVES

E5.15.1 Identify plants whose seeds need special treatment for germination to occur.

E5.15.2 Identify germination inhibitors such as dormancy, rest, hard seed coat, and immature embryo.

E5.15.3 Demonstrate seed cleaning techniques:
  a. Dry seed pods; then crush and screen to remove seeds.
  b. Soak and process fleshy seeds; then dry and screen to remove seeds.

E5.15.4 Demonstrate seed treatment techniques:
  a. Scarify seeds with hard seed coats by scratching with a triangular file or by soaking in concentrated acid for approximately 30 minutes and rinse in water.
  b. Stratify seeds with immature embryos by mixing with moist sand or peat and storing the mixture in plastic bags under refrigeration.
  c. Provide partial ventilation or fungicide treatment to keep stored seeds from rot organisms.

CRITERION-REFERENCED MEASURE

C5.15 Seeds cleaned and treated so that embryo is not injured and germination inhibitors are removed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display samples or illustrations of seeds that need special treatment for germination (E5.15.1).
2. Discuss germination inhibitors (E5.15.2).
3. Have students collect seeds from temperate-zone landscape plants, such as dogwood, oak, maple, yew, magnolia, walnut, and apple (E5.15.1).
4. Have students practice seed cleaning and treatment techniques (E5.15.3, E5.15.4).
5. Have students compare germination success of plants that do and do not need special treatment when treated and when sown immediately after collection (E5.15.1-E5.15.4).
6. Have students grow a few plants from seed collected from named cultivators to observe genetic variation from sexual reproduction (E5.15.3, E5.15.4).

SELECTED TOOLS AND MATERIALS

Collected seeds
Flats and germination media
Triangular file
Sulfuric or hydrochloric acid
Sand or shredded peat
Cleaning screen
Containers

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, p. 232. Boodley.
Plant Propagation, Principles, and Practices, pp. 171-180. Hartmann and Kester.
Pretreating Seeds to Stimulate Germination. Learning Activity Package in Horticulture. VPI & SU.

DUTY AREA

6. CULTIVATING GREENHOUSE AND NURSERY PLANTS

TASKS/COMPETENCIES

6.1 Hand irrigate plants

6.2 Apply granular fertilizer to planted crops

6.3 Apply liquid fertilizer to planted crops

6.4 Space plants

6.5 Pinch flowering plants

6.6 Disbud plants

6.7 Prune plants

6.8 Stake and tie plants as they grow

6.9 Apply growth regulators

6.10 Force bulbs

DUTY AREA

6. CULTIVATING GREENHOUSE AND NURSERY PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

6.1 Hand irrigate plants

COURSE

Horticulture III (8034)

6.1

PERFORMANCE OBJECTIVE

P6.1 Given an area of planted stock and necessary equipment and supplies, hand irrigate the plants. Water will be applied in sufficient quantity to soak the soil completely in container plants and/or provide the equivalent of 1 inch of rainfall on plants growing in the field.

SELECTED ENABLING OBJECTIVES

E6.1.1 Explain effects of watering techniques and equipment on root growth, soil washing, and soluble salts.

E6.1.2 List techniques for determining when plants need watering.

E6.1.3 Apply water, according to requirements.

E6.1.4 Store can, hose, or other equipment. Drain water from hose.

E6.1.5 Identify effects of improper watering techniques.

CRITERION-REFERENCED MEASURE

C6.1 Plants irrigated by hand. Soil completely soaked in container plants, and the equivalent of 1 inch of rainfall applied on plants growing in field.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss factors to consider in selecting various watering techniques (E6.1.1, E6.1.2).
2. Have students hand water greenhouse, landscape, and house plants, using various water breakers (seedling, mist, rose) and watering cans (E6.1.3).
3. Demonstrate the effects of improper watering techniques, such as too frequent, excessive amounts (fertilizer leaching), insufficient volume, media compaction, seed and plant washing, and soluble salts (E6.1.1-E6.1.5).
4. Discuss proper treatment and storage procedures for all equipment (E6.1.4).

SELECTED TOOLS AND MATERIALS

Watering cans
Water hoses
Water breakers
Measuring device

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Moisture, Drainage, and Minerals. Teaching Aids.
Nursery Maintenance - Watering. Teaching Aids.
Transparency: "Water Supply," Illustrated Horticulture.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 50.
Nursery Production. V-TECS. Performance Objectives 35 and 36.
Ornamental Horticulture, pp. 134-138. McDaniel.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 7.

DUTY AREA

6. CULTIVATING GREENHOUSE AND NURSERY PLANTS

TASK / COMPETENCY

6.2 Apply granular fertilizer to planted crops

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

6.2

PERFORMANCE OBJECTIVE

P6.2 Given a crop to be fertilized, granular fertilizer, and the necessary application equipment, apply the granular fertilizer to planted crop. The granular fertilizer must be applied in the amount and ratio designated according to instructor's guidelines. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E6.2.1 Identify reasons for using granular fertilizers over liquid fertilizers.

E6.2.2 Describe the various types of fertilizer application equipment such as broadcast, drop, and hand.

E6.2.3 Outline methods for calibrating the spreader.

E6.2.4 Set feed controls on spreader to apply the desired amount of fertilizer.

E6.2.5 Apply fertilizer uniformly and wash or brush fertilizer granules off plant foliage.

E6.2.6 Wash spreader with water to remove dust or granules that have a corrosive effect on the spreader.

E6.2.7 Treat moving parts of spreader with oil and store when job is finished.

E6.2.8 Demonstrate how to apply granular fertilizer by hand to selected greenhouse or field grown plants.

E6.2.9 List and follow safety precautions.

CRITERION-REFERENCED MEASURE

C6.2 Granular fertilizer applied to planted crops in amount and ratio as specified in instructor's guidelines. All safety procedures observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display various types of fertilizers and application equipment (E6.2.1, E6.2.2).
2. Show students a comparison of effects of different types and amounts of fertilizers on crop growth (E6.2.1).
3. Have students operate different types of application equipment (E6.2.3).
4. Have students calibrate equipment (E6.2.3, E6.2.4).
5. Have students apply granular fertilizer to planted crops (E6.2.3-E6.2.9).
6. Have students top dress nursery container plants, comparing soluble and slow-release dry fertilizers (E6.2.5).
7. Have students top dress or sidedress fruit and vegetable crops (E6.2.5).

SELECTED TOOLS AND MATERIALS

Water soluble fertilizer
Measuring tools
Scale
Mixing containers
Hozon proportioner
Rubber gloves
Handout: Instructor's guidelines

SELECTED AUDIOVISUAL MATERIALS

Filmstrips/Cassettes:	Fertilizers and Soil Fertility. Teaching Aids. Fertilizing Ornamental Plants. Vocational Education Productions.
Transparency:	"Fertilizer and pH," Illustrated Horticulture.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 46.
Working in Horticulture, pp. 79-81. Richardson and Moore.

DUTY AREA

6. CULTIVATING GREENHOUSE AND NURSERY PLANTS

TASK/COMPETENCY

6.3 Apply liquid fertilizer to planted crops

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

6.3

PERFORMANCE OBJECTIVE

P6.3 Given a crop to be fertilized, an irrigation system, liquid fertilizer, the desired ratios of fertilizer liquid to water, and an injection system, apply the liquid fertilizer mechanically to planted crops. The liquid fertilizer must be applied in the amount designated by instructor's guidelines. All safety precautions must be followed.

SELECTED ENABLING OBJECTIVES

E6.3.1 Explain the reasons for using liquid fertilization over dry fertilization.

E6.3.2 Describe the types of fertilizer injectors and how they work.

E6.3.3 Demonstrate how to use a fertilizer injector.

E6.3.4 Determine the amount of liquid fertilizer required to give the desired ratios.

E6.3.5 State how to verify that fertilizer is being injected into the irrigation supply.

E6.3.6 Flush the system following use to prevent corrosion and deterioration of system.

E6.3.7 Compare effects of different types and amounts of fertilizer on crop growth.

E6.3.8 List and follow safety precautions.

CRITERION-REFERENCED MEASURE

C6.3 Liquid fertilizer applied to planted crops in the amount designated by instructor's guidelines with all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Study soluble fertilizer labels and mixing directions to determine proper application rates and ratios (E6.3.2, E6.3.4).
2. Demonstrate application of liquid fertilizer through a hose or other injector to greenhouse pot and bedded crops (either hand or automatic irrigation systems) (E6.3.5).
3. Demonstrate application of liquid fertilizer to nursery container crops using an injector and overhead sprinkler system (E6.3.1-E6.3.3).
4. Compare crop growth with only dry fertilizers, constant liquid feed, slow-release fertilizers and no fertilizer (E6.3.7).
5. Intentionally plug or break suction of the fertilizer injector for students to identify, locate, and correct a malfunctioning injector (E6.3.5, E6.3.6).
6. Review safety precautions (E6.3.8).

SELECTED TOOLS AND MATERIALS

Liquid fertilizer
Liquid fertilizer injection system
Handout: Instructor's guidelines

SELECTED AUDIOVISUAL MATERIALS

Slides: Bedding Plant Equipment. Ohio Curriculum Materials.

SELECTED REFERENCES

Ornamental Horticulture, pp. 132-138, 215-216. McDaniel.
The Commercial Greenhouse, pp. 179, 183-186. Boodley.
Managing the Greenhouse Soil Environment. Ohio Curriculum Materials.
Nursery Production -- A Student Handbook, pp. 158-160. Pennsylvania State University.

DUTY AREA

6. CULTIVATING GREENHOUSE AND NURSERY PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

6.4 Space plants

COURSE

Horticulture III (8034)

6.4

PERFORMANCE OBJECTIVE

P6.4 Given containers of nursery stock and/or greenhouse potted plants, space the plants. Plants must be located and spaced in accordance with instructor-provided guidelines.

SELECTED ENABLING OBJECTIVES

E6.4.1 Identify the effects of plant competition in the field and in containers.

E6.4.2 Determine proper spacing for plants, considering the plant type and time before plant is moved again.

CRITERION-REFERENCED MEASURE

C6.4 Plants located and spaced correctly according to instructor-prepared guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss reasons for spacing plants (E6.4.1).
2. Demonstrate techniques for marking proper spacings on benches or in field beds (E6.4.2).
3. Have students determine what is adequate growing space for nursery stock (E6.4.1, E6.4.2).
4. Have students practice spacing various types of container plants (E6.4.1, E6.4.2).

SELECTED TOOLS AND MATERIALS

Measuring rule
Handout: Instructor-provided guidelines
Worksheets: Nursery Work Sheets. Hobar.

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Nursery Production. V-TECS. Performance Objective 34.

Application

DUTY AREA

6. CULTIVATING GREENHOUSE
AND NURSERY PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

6.5 Pinch flowering plants

COURSE

Horticulture III (8034)

6.5

PERFORMANCE OBJECTIVE

P6.5 Given flowering plants in pots, beds, or a field area and a pail or other receptacle, pinch the plants. For plants 4 to 6 inches in height only about 4 to 6 leaves will be left on the pinched stem; on small plants only the very tip of the stem (about 1/2 inch) will be pinched.

SELECTED ENABLING OBJECTIVES

E6.5.1 Identify plants which need to be pinched.

E6.5.2 Grasp the stem tip and young immature leaves of a plant, snapping them from the plant by means of the thumb and forefinger.

E6.5.3 Dispose of the severed tips and leaves.

E6.5.4 Explain the effects of pinching plants.

CRITERION-REFERENCED MEASURE

C6.5 Plants pinched so that plants 4 to 6 inches in height have 4 to 6 leaves on pinched stem, smaller plants only tip of stem (1/2 inch) pinched.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Conduct an experiment that demonstrates the effect of pinching (E6.5.1-E6.5.3).
2. Have students pinch selected herbaceous plants (E6.5.1-E6.5.3).
3. Have students observe and chart the growth of auxilliary buds on pinched plants (E6.5.4).

SELECTED TOOLS AND MATERIALS

Crop of flowering plants
Pail or other receptacle
Worksheets: Nursery Worksheets. Hobar.

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, pp. 290-291. Boodley.
Floriculture Worker. V-TECS. Performance Objective 29.
Introductory Horticulture, pp. 159-166. Reiley and Shry.

DUTY AREA

6. CULTIVATING GREENHOUSE AND NURSERY PLANTS

TASK/COMPETENCY

6.6 Disbud plants

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

6.6

PERFORMANCE OBJECTIVE

P6.6 Given six to eight flowering potted plants in the bud stage or a greater number growing in a bed and the purpose or utility for which they are being grown, disbud the plants. Plants must be disbudded without any unnecessary damage and in such a way that their intended utility will be achieved.

SELECTED ENABLING OBJECTIVES

E6.6.1 Identify plants that benefit from disbudding.

E6.6.2 Determine purpose for which a plant is being grown.

E6.6.3 Pinch off buds using thumb and forefinger, working systematically from one end of the bed to the other.

E6.6.4 Dispose of parts removed from plants.

CRITERION-REFERENCED MEASURE

C6.6 Plants disbudded without any unnecessary damage and in the correct manner for the desired purpose.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Conduct an experiment using carnations or mums to demonstrate the effect on size of blooms on disbudded plants (E6.6.1-E6.6.4).
2. Demonstrate corrective procedure for accidental loss of terminal bud (E6.6.1-E6.6.4).
3. Have students practice disbudding plants to control size and number of blooms (E6.6.1-E6.6.4).

SELECTED TOOLS AND MATERIALS

Crop of flowering plants such as carnations or mums
Pail or other receptacle
Worksheets: Nursery Worksheets. Hobar.

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, pp. 291-292. Boodley.
Floriculture Worker. V-TECS. Performance Objective 30.
Introductory Horticulture, pp. 175-176. Reiley and Shry.
Ornamental Horticulture, Chapter 6. McDaniel.

Application

DUTY AREA

6. CULTIVATING GREENHOUSE AND NURSERY PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

6.7 Prune plants

COURSE

Horticulture III (8034)

6.7

PERFORMANCE OBJECTIVE

P6.7 Given pruning instructions, a pruning knife, shears, a bucket or pail, and three potted plants, each of which is to be pruned for a specified purpose, prune the plants. Prune one plant to restrict growth and induce branching, one plant to improve shape, and one plant to remove dead or diseased parts. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E6.7.1 Select plants to be pruned.

E6.7.2 State reasons for pruning.

E6.7.3 Take tips off all stems.

E6.7.4 Remove all dead and/or diseased wood.

E6.7.5 Remove any broken or crossed limbs.

E6.7.6 Cut off or clip off unbalanced or unsymmetrical branches and stems.

E6.7.7 Pinch or cut off all dead leaves and cut out spindly or weak shoots.

E6.7.8 Continue pruning plants to desired shape.

E6.7.9 Dispose of all removed parts.

CRITERION-REFERENCED MEASURE

C6.7 One plant pruned to restrict growth and induce branching, one plant to improve its shape, and one plant to remove dead or diseased plant parts; all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss reasons for pruning (E6.7.1, E6.7.2).
2. Select plant examples requiring various types of pruning and demonstrate the needed pruning (E6.7.1-E6.7.9).
3. Have students practice pruning potted plants (E6.7.1-E6.7.9).
4. Demonstrate specialized pruning techniques such as bonsai and topiary work (E6.7.2-E6.7.9).

SELECTED TOOLS AND MATERIALS

Pruning knife or shears
Bucket or pail
Potted plants or cut-flower bed
Pruning instructions

SELECTED AUDIOVISUAL MATERIALS

Filmstrips/Cassettes:	Pruning. Teaching Aids. The Elements of Pruning. Vocational Education Productions..
Transparency:	"Planting and Maintenance," Illustrated Horticulture. PM-25--PM-33.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 31.
Introductory Horticulture, pp. 375-382. Reiley and Shry.
Ornamental Horticulture, pp. 372-373. McDaniel.

DUTY AREA

6. CULTIVATING GREENHOUSE AND NURSERY PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

6.8 Stake and tie plants as they grow

COURSE

Horticulture III (8034)

6.8

PERFORMANCE OBJECTIVE

P6.8 Given suitable twine or string, the necessary stakes, and flowering plants requiring support other than that provided by roots, stake and tie the plants. Support stakes must be placed in such a way that they will not damage existing roots or impair root development, and string must not be tied so tightly that it will cut or damage the stems and branches.

SELECTED ENABLING OBJECTIVES

E6.8.1 Identify the particular plants that need to be staked and tied.

E6.8.2 Place stakes in such a way that they will not damage roots and at a sufficient depth to sustain the plants.

E6.8.3 Tie plants to stakes firmly to hold them in an upright position, but not so tightly that stems will be damaged or growth impeded. Larger plants should be tied both at or near the top and also near the bottom.

E6.8.4 Return tools and materials to storage.

CRITERION-REFERENCED MEASURE

C6.8 Plants staked and tied so that stake does not damage roots or impair root growth, and string tied so that plant is not cut or damaged but is still supported.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss reasons for staking and tying specific plants (E6.8.1).

2. Demonstrate procedure for tying specific plants (E6.8.1-E6.8.4).

3. Have students do the following (E6.8.1-E6.8.4):
    a. Stake flowering plants requiring support without damaging the plant (pot chrysanthemums, roses, Easter lilacs).
    b. Stake slender nursery trees.
    c. Stake or otherwise support vining vegetable crops.

SELECTED TOOLS AND MATERIALS

Twine or string
Bamboo stakes
Flowering plants
Shears
Burlap or tree wrap paper

SELECTED AUDIOVISUAL MATERIALS

Transparency: "Planting and Maintenance," Illustrated Horticulture. PM-45, PM-47.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 43.
Introductory Horticulture, pp. 340-341. Reiley and Shry.

DUTY AREA

6. CULTIVATING GREENHOUSE AND NURSERY PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

6.9 Apply growth regulators

COURSE

Horticulture III (8034)

6.9

PERFORMANCE OBJECTIVE

P6.9 Given a suitable sprayer, the required chemical solution, and floral plants to be treated, apply growth regulating chemicals. The chemical solution must be sprayed uniformly and evenly over the entire leaf area of the plant, and all safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E6.9.1 Perform the following sequenced job skills for spray treatment:
- a. Read manufacturer's specifications, especially those having to do with safety, rate of application, and proper operation.
- b. Make sure the sprayer is clean and functions properly.
- c. Fill sprayer with required spray solution.
- d. Bring tank to required air pressure.
- e. Spray plants, covering entire leaf area.
- f. Clean sprayer and other equipment, making sure that sprayer is thoroughly rinsed and that screens and nozzles are treated with diesel fuel to prevent corrosion.

E6.9.2 Perform the following sequenced job skills for drench treatment:
- a. Read manufacturer's specifications, especially those having to do with safety and rate of application.
- b. Mix proper concentration of growth regulator solution.
- c. Apply measured amount to each plant.
- d. Clean all equipment.

CRITERION-REFERENCED MEASURE

C6.9 Growth regulators applied uniformly and evenly over entire leaf area of plant, and all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss and demonstrate the effects of growth regulating chemicals (A-rest and B-nine, Cycocel, and ancymidol) (E6.9.1, E6.9.2).
2. Conduct an experiment to show the effects of varying strengths of growth regulators (E6.9.1, E6.9.2).
3. Have students practice applying growth regulators using spray treatments (E6.9.1).
4. Have students practice applying growth regulators using drench treatments (E6.9.2).

SELECTED TOOLS AND MATERIALS

Hand sprayer marked "Growth Hormones Only"
Chemical growth retardant such as B-nine
Crop of potted mums
Protective clothing as required
Mixing and drench-application containers

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Bedding Plant Production. Task Sheets. Ohio Curriculum Materials.
Floriculture Worker. V-TECS. Performance Objective 32.
Introductory Horticulture, pp. 161-165. Reiley and Shry.
Nursery Production. V-TECS. Performance Objective 15.
Working in Horticulture, pp. 109-110. Richardson and Moore.

Application

DUTY AREA

6. CULTIVATING GREENHOUSE AND NURSERY PLANTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

6.10 Force bulbs

COURSE

Horticulture III (8034)

6.10

PERFORMANCE OBJECTIVE

P6.10 Given the necessary equipment and one or more types of Dutch bulbs which are to be forced to meet a prescribed time schedule, force bulbs to meet the required schedule by controlling temperature, moisture, and light. At least 95% of the bulbs must produce flowers on schedule.

SELECTED ENABLING OBJECTIVES

E6.10.1 Outline bulb crop life cycle and dormancy/rest (pre-cooling) requirements.

E6.10.2 Explain the necessity for drenching the bulbs with fungicide.

E6.10.3 Plant bulbs in desired medium in a finishing container.

E6.10.4 Place planted containers in cold storage, at 40°F for a period of time calculated according to time charts for forcing bulbs.

E6.10.5 Remove container to growing area at appropriate time for the particular variety.

E6.10.6 Maintain moisture and light levels as near the desired level as possible.

CRITERION-REFERENCED MEASURE

C6.10 Bulbs forced by controlling temperature, moisture, and light so that 95% of bulbs flower on schedule.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Explain bulb crop life cycles and dormancy/rest requirements (E6.10.1).

2. Demonstrate procedures(s) for forcing bulbs (E6.10.2-E6.10.6).

3. Have students do the following (E6.10.1-E6.10.6):
    a. Force bulbs (lilies, tulips, hyacinths, daffodils) for Valentine's Day and Easter.
    b. Demonstrate effects of various storage temperatures on bulbs.
    c. Demonstrate leaf count method for adjusting Easter lily forcing environment.
    d. Practice forcing bulbs.

SELECTED TOOLS AND MATERIALS

Dutch bulbs such as tulips, hyacinths, and daffodils.
Potting soil and bulb pans
Refrigeration source
Thermometers
Water source
Greenhouse or suitable forcing area
Worksheets: Nursery Worksheets. Hobar.

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, p. 291. Boodley.
Floriculture Worker. V-TECS. Performance Objective 33.

DUTY AREA

7. CONTROLLING PESTS

TASKS/COMPETENCIES

7.1 Identify and report common diseases, weeds, and insect damage

7.2 Remove weeds manually

7.3 Remove weeds with power tools

7.4 Remove dead, diseased, or damaged plants and plant parts

7.5 Apply mulches

7.6 Dust crops

7.7 Mix pesticides

7.8 Apply insecticides and fungicides

7.9 Apply herbicides

7.10 Identify and report spray damage

7.11 Control animal pests

7.12 Fumigate greenhouse

DUTY AREA

7. CONTROLLING PESTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

7.1 Identify and report common diseases, weeds, and insect damage

COURSE

Horticulture III (8034)

7.1

PERFORMANCE OBJECTIVE

P7.1 Given a designated turfgrass area with known weed infestation and insect damage, floral plants growing in a greenhouse, shadehouse, or in an open field, flowers or shrubs in an outdoor bed, and the necessary tools and forms, identify and report common diseases, weeds, and insect damage found in inspecting the plants and turfgrass. All competing weeds must be identified and the seriousness of their presence reported; organisms responsible for insect and disease damage must be identified; and 90% of any observable and distinguishable damage must be reported correctly.

SELECTED ENABLING OBJECTIVES

E7.1.1 List and identify common diseases, weeds, and insects which can cause plant damage.

E7.1.2 Identify the areas in which diseases, weeds, and insects may be found.

E7.1.3 Observe plants and distinguish between damage caused by insects and that which appears to be the result of disease.

E7.1.4 Report findings.

CRITERION-REFERENCED MEASURE

C7.1 Diseases, weeds, and insect damage identified and reported with 90% of any observable and distinguishable damage reported correctly.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Use slides and other visual aids to illustrate injuries from common insects, diseases, and weeds (E7.1.1).
2. Provide students with a list of diseases, weeds, and insects which can cause plant damage (E7.1.1).
3. Have students practice identifying and reporting disease, weed, and insect damage in a variety of growing environments (E7.1.1-E7.1.4).
4. Explain the procedure for reporting disease and insect damage (E7.1.4.

SELECTED TOOLS AND MATERIALS

Magnifying hand lens
Reporting forms
Designated crops
Insect/weed guides

SELECTED AUDIOVISUAL MATERIALS

Filmstrips/Cassettes: Insect Damage Identification. Singer Career Systems.
Slides: Common Insects of Greenhouse Crops. Ohio Curriculum Materials.
Pests of Landscape and Garden Plants. Virginia Cooperative Extension Service.

SELECTED REFERENCES

Agriculture Lesson Plans: Turf Insects and Diseases. Southern Illinois University at Carbondale.
Applying Pesticides, Management, Application Safety, pp. 6-13. AAVIM.
Floriculture Worker. V-TECS. Performance Objective 56.
Gardening-Groundskeeping. V-TECS. Performance Objective 47.
Introductory Horticulture, pp. 193-203. Reiley and Shry.
Turfgrass Maintenance Workers. V-TECS. Performance Objectives 12, 11, and 10.
Virginia Pest Control Guide. Publication 456-001. Virginia Cooperative Extension Service.
Working in Horticulture, pp. 174-182. Richardson and Moore.

DUTY AREA
7. CONTROLLING PESTS

PROGRAM
HORTICULTURE (01.0601)

TASK/COMPETENCY
7.2 Remove weeds manually

COURSE
Horticulture III (8034)

7.2

PERFORMANCE OBJECTIVE

P7.2 Given potted plants and/or a field area or bed of flowering plants to be weeded, and a hoe or other suitable implement, remove the weeds manually. Plants must not be damaged in the process, and all visible weeds must be removed within a period of time specified by the instructor.

SELECTED ENABLING OBJECTIVES

E7.2.1 Identify kinds of weeds which may appear in potted plants or floral beds.

E7.2.2 Identify appropriate weed-removing tools.

E7.2.3 Dispose of collected weeds when task is completed.

CRITERION-REFERENCED MEASURE

C7.2 All visible weeds removed manually within time period designated by instructor without damage to the plants.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss characteristics and types of weeds (E7.2.1).
2. Have students use slides, flash cards, and other visual material to identify common weeds and report the same accurately (E7.2.1).
3. Arrange for students to view weeds, including seedlings and mature plants, growing in the environment (E7.2.1).
4. Have students practice removing weeds from potted plants, nursery crops, and landscape beds (E7.2.2, E7.2.3).

SELECTED TOOLS AND MATERIALS

Crop or greenhouse bench of flowering plants
Hoe, cultivator, or other weed-removing tool
Wheelbarrow or other container for discarded weeds

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Bed Maintenance. Career Aids, Inc.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objectives 60 and 61.
Gardening-Groundskeeping. V-TECS. Performance Objective 49.
Horticulture, pp. 427-431. Halfacre and Barden.
Introductory Horticulture, p. 207. Reiley and Shry.
Nursery Production. V-TECS. Performance Objective 44.
Working in Horticulture, p. 182. Richardson and Moore.

Application

DUTY AREA

7. CONTROLLING PESTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

7.3 Remove weeds with power tools

COURSE

Horticulture III (8034)

7.3

PERFORMANCE OBJECTIVE

P7.3 Given a field of flowers planted in rows and a power cultivator, remove the weeds with power tools. No more than 1% of the floral plants should be damaged in the cultivation process, and at least 90% of all visible weeds must be killed. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E7.3.1 Identify the field area to be cultivated.

E7.3.2 Connect cultivator to tractor and perform a pre-service check on the unit.

E7.3.3 Set cultivator sweep distances and make necessary adjustments on the cultivator.

E7.3.4 Drive tractor down rows, removing as many weeds as possible without damaging the floral crop.

E7.3.5 Clean and store cultivator and tractor when the task is completed.

E7.3.6 List and follow safety precautions.

CRITERION-REFERENCED MEASURE

C7.3 Weeds removed from flower field using tractor, cultivator, or other power tool. No more than 1% of the floral plants damaged in the cultivation process and at least 90% of all visible weeds killed. All safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss ways to control weeds by cultivation (E7.3.1-E7.3.6).
2. Demonstrate how to make necessary connections and adjustments on the cultivator prior to use (E7.3.2, E7.3.3).
3. Demonstrate how to remove weeds from flower field using a tractor with cultivator attachment or other power tool (E7.3.4).
4. Have students use a tractor-mounted cultivator or rotary tiller to cultivate soil in a nursery, fruit, or vegetable laboratory plot (E7.3.2-E7.3.4).
5. Have students clean and store power tools when task is completed (E7.3.5).
6. Review safety precautions as necessary (E7.3.6).

SELECTED TOOLS AND MATERIALS

Field of flowering plants
Power cultivator or tractor and cultivator

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 62.

DUTY AREA

7. CONTROLLING PESTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

7.4 Remove dead, diseased, or damaged plants and plant parts

COURSE

Horticulture III (8034)

7.4

PERFORMANCE OBJECTIVE

P7.4 Given pruning shears, a knife, and group of greenhouse plants and/or field grown plants, remove all dead and diseased blooms, plant parts, or plants. At least 98% of the dead, damaged, or diseased blooms, plant parts, and plants must be removed, and healthy plants must not be damaged. All safety precautions must be followed.

SELECTED ENABLING OBJECTIVES

E7.4.1 Explain reasons for removing dead, diseased, or damaged plants and plant parts.

E7.4.2 Explain importance of sanitation in controlling pest problems.

E7.4.3 Demonstrate other cultural controls such as care of watering equipment, weed removal from greenhouse area, soil pasteurization, and cleaning of containers and tools for control of insect and disease pests.

E7.4.4 Identify dead, diseased, or damaged plants and plant parts.

E7.4.5 Dispose of all diseased plants, plant parts, and litter.

CRITERION-REFERENCED MEASURE

C7.4 Ninety-eight percent of dead, diseased, or damaged plants and plant parts removed without damage to healthy plants. All safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss reasons for removal of dead, damaged, or diseased plants and plant parts and other sanitation cultural controls (E7.4.1-E7.4.3).
2. Have students clean and sterilize tools and equipment and used containers with 9:1 bleach solution (E7.4.3).
3. Assign specific areas of greenhouse and other growing sites for sanitation maintenance (E7.4.1-E7.4.5).
4. Have students practice removing dead, damaged, and diseased plants (E7.4.4, E7.4.5).

SELECTED TOOLS AND MATERIALS

Pruning shears
Floral knife
Crop of flowering plants
Container for plant debris

SELECTED AUDIOVISUAL MATERIALS

Slides: Diagnosing Problems on Indoor Plants. Ohio Curriculum Materials.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objectives 59 and 80.
Introductory Horticulture, pp. 207-213. Reiley and Shry.
Nursery Production. V-TECS. Performance Objectives 42 and 62.

DUTY AREA

7. CONTROLLING PESTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

7.5 Apply mulches

COURSE

Horticulture III (8034)

7.5

PERFORMANCE OBJECTIVE

P7.5 Given plants and the necessary equipment and supplies, apply mulch around the plants. The mulch must extend laterally to a distance equal to the spread of the plant. Mulch for plants set in a bed should extend over the entire area of the bed.

SELECTED ENABLING OBJECTIVES

E7.5.1 Identify types of mulches.

E7.5.2 Explain reasons for applying mulch.

E7.5.3 Prepare soil and plants for mulch, if required.

E7.5.4 Spread mulch evenly over area.

CRITERION-REFERENCED MEASURE

C7.5 Mulch applied to plants, extending laterally to a distance equal to spread of plant, or over entire area of bed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display types of mulches and discuss reasons for their use (E7.5.1, E7.5.2).

2. Have students do the following (E7.5.3, E7.5.4):
   a. Apply organic mulches to fruit, vegetable, and/or landscape plants.
   b. Apply black plastic as a single mulch for fruit and vegetable planting.
   c. Use stone, bark chips, or other ornamental mulches over plastic in landscape beds.

3. Arrange for students to visit a park or some landscaped area and identify types of mulches and reasons for their application (E7.5.1, E7.5.2).

SELECTED TOOLS AND MATERIALS

Black plastic
Organic mulches
Other mulching materials

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Ornamental Horticulture, pp. 460-465. McDaniel.
Working in Horticulture, pp. 84-85. Richardson and Moore.

DUTY AREA

7. CONTROLLING PESTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

7.6 Dust crops

COURSE

Horticulture III (8034)

7.6

PERFORMANCE OBJECTIVE

P7.6 Given plants that need dusting and the necessary equipment and supplies, dust the plants. The plants must show evidence of insect control within the time span indicated in the manufacturer's specifications. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E7.6.1 Determine the disease or pests to be controlled or prevented.

E7.6.2 List and describe various methods used to dust crops.

E7.6.3 Explain how to select proper chemical to be used.

E7.6.4 Check chemical for toxicity.

E7.6.5 List and follow safety precautions.

E7.6.6 Interpret manufacturer's recommendations.

CRITERION-REFERENCED MEASURE

C7.6 Plants dusted and insects controlled within time span indicated in manufacturer's specifications, and all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. List and discuss types of diseases and pests that can be controlled by dusting (E7.6.1).
2. Demonstrate how to select chemicals (E7.6.3).
3. Emphasize required safety precautions (E7.6.5).
4. Demonstrate how to use various materials used for dusting, spraying, and granular broadcast treatment, and discuss their advantages and disadvantages (E7.6.2-E7.6.6).
5. Have students practice dusting selected vegetable and landscape plants in a given area (E7.6.2-E7.6.6).
6. Show filmstrip Pesticides: Safe Handling and Use and discuss (E7.6.4-E7.6.6).

SELECTED TOOLS AND MATERIALS

Dusting equipment
Chemicals

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Pesticides: Safe Handling and Use. Bergwall Productions.
Film: Be a Pro with Pesticides. Cornell University. Available from Virginia Cooperative Extension Service.

SELECTED REFERENCES

Agricultural Lesson Plans: Turf Insects and Diseases. Southern Illinois University at Carbondale.
Applying Pesticides, Management, Application, Safety. AAVIM.
Pesticide Application Certification Training Manual, pp. 65-66. Virginia Cooperative Extension Service.

DUTY AREA

7. CONTROLLING PESTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

7.7 Mix pesticides

COURSE

Horticulture III (8034)

7.7

PERFORMANCE OBJECTIVE

P7.7 Given water or other suitable solvent, and pesticides for controlling insects, disease, or weeds in a greenhouse, shadehouse, open field, or lawn area, and the necessary equipment, mix the pesticides with a sufficient amount of water or solvent to cover a specified area. Mixing procedures must conform to manufacturer's specifications and written requirements specified by the instructor. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E7.7.1 Determine exact mixing procedures and the amount of spray solution required, using manufacturer's specifications.

E7.7.2 List and follow safety precautions.

E7.7.3 Clean all containers and other items used for mixing and return to storage.

E7.7.4 Dispose of used cartons or other contaminants in accordance with current Evnironmental Protection Agency regulations.

CRITERION-REFERENCED MEASURE

C7.7 Pesticides mixed according to instructor's written requirements and manufacturer's specifications.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss the difference in mixing rates on a concentration versus treatment area and have students calibrate a sprayer to determine the mixing rate difference (E7.7.1).
2. Demonstrate effects of mixing techniques for wettable powders and explain why agitation is necessary to maintain a uniform suspension (E7.7.1, E7.7.2).
3. Inventory pest control materials used at the school and prepare a wall chart on hazards, safety equipment needed, and appropriate uses (E7.7.1-E7.7.4).
4. Have students practice mixing pesticides in accordance with manufacturer's specifications (E7.7.1-E7.7.4).

SELECTED TOOLS AND MATERIALS

Manufacturer's specifications
Measuring devices
Mixing containers
Pesticides
Safety protection devices
Water
Handout: Instructor's written requirements

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Pesticides: Safe Handling and Use. Bergwall Productions.

SELECTED REFERENCES

Agricultural Lesson Plans: Turf Insects and Diseases. Southern Illinois University at Carbondale.
Applying Pesticides, Management, Application, Safety, pp. 34-39. AAVIM.
Floriculture Worker. V-TECS. Performance Objective 57.
Nursery Production. V-TECS. Performance Objective 41.
Pesticide Application Certification Training Manual, pp. 58-60. Virginia Cooperative Extension Service.
Turfgrass Maintenance Worker. V-TECS. Performance Objectives 15, 14, and 25.

DUTY AREA

7. CONTROLLING PESTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

7.8 Apply insecticides and fungicides

COURSE

Horticulture III (8034)

7.8

PERFORMANCE OBJECTIVE

P7.8 Given a designated land area or group of plants in need of pest control or pesticide and the necessary spraying and safety equipment, apply the insecticide and/or fungicide. The amount of chemical applied must be within ± 5% of the amount recommended by the state cooperative extension service; the recommended mixture must be used; all safety rules must be observed; and the solution must be applied uniformly at the recommended rate.

SELECTED ENABLING OBJECTIVES

E7.8.1 Identify pest problems in area to be sprayed with insecticide and/or fungicide.

E7.8.2 Identify appropriate pest control measures.

E7.8.3 Mix chemicals in accordance with manufacturer's specifications.

E7.8.4 List and follow required safety precautions.

E7.8.5 Determine amount of chemical to be applied.

E7.8.6 Outline proper application procedures.

E7.8.7 Clean spray equipment after use.

E7.8.8 Store pesticides and equipment properly.

E7.8.9 Dispose of pesticide containers properly.

CRITERION-REFERENCED MEASURE

C7.8 Insecticide and fungicide applied within ± 5% of amount recommended by state cooperative extension service; recommended mixture used; all safety rules followed; solution applied uniformly at recommended rate.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students review pest problems which require the use of insecticides and/or fungicides (E7.8.1, E7.8.2).
2. Give demonstrations as needed on mixing procedures and safety precautions (E7.8.3, E7.8.4).
3. Have students read and interpret manufacturer's specifications to determine mixing techniques, recommended proportions, and application procedures (E7.8.5, E7.8.6).
4. Have students practice applying different types of herbicides and pesticides to land area or greenhouse plant groups (E7.8.1-E7.8.9).
5. Emphasize importance of proper cleaning and storing of equipment and proper storage and/or disposal of chemicals and chemical containers (E7.8.7-E7.8.9).

SELECTED TOOLS AND MATERIALS

Chemicals as required for pest controls
Manufacturer's specifications
Mixing containers
Safety protection gear
Spray equipment

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Pesticides: Safe Handling and Use. Bergwall Productions.

SELECTED REFERENCES

Agricultural Lesson Plans: Turf Insects and Diseases. Southern Illinois University at Carbondale.
Floriculture Worker. V-TECS. Performance Objective 8.
Gardening-Groundskeeping. V-TECS. Performance Objectives 41, 42, and 113.
Nursery Production. V-TECS. Performance Objectives 39 and 43.
Turfgrass Maintenance Workers. V-TECS. Performance Objectives 19 and 16.

DUTY AREA

7. CONTROLLING PESTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

7.9 Apply herbicides

COURSE

Horticulture III (8034)

7.9

PERFORMANCE OBJECTIVE

P7.9 Given a designated area of land, a herbicide, protective clothing, and the necessary tools and equipment, apply the herbicide according to the instructions on the manufacturer's label or those recommended by the state cooperative extention service. The amount of herbicide applied will be ± 5% of the amount recommended, all safety procedures must be followed, and there will be little or no resulting damage to the remaining desirable plants.

SELECTED ENABLING OBJECTIVES

E7.9.1 Explain the need to check the sprayer to make sure it is in good working order.

E7.9.2 Calibrate the sprayer to apply the precise amount of spray desired.

E7.9.3 Describe appropriate clothing to wear to meet safety requirements.

E7.9.4 Put spray solution in sprayer.

E7.9.5 Bring spray tank to recommended pressure.

E7.9.6 Compare and contrast dusting, spraying, and granule application methods.

E7.9.7 Clean sprayer and all equipment used and return to storage.

CRITERION-REFERENCED MEASURE

C7.9 Herbicide applied within ± 5% of amount recommended on manufacturer's label or by state cooperative extension service with little or no resulting damage to remaining desirable plants; all safety procedures followed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Give demonstrations as needed on use, care, and storage of equipment (E7.9.1-E7.9.7).
2. Have students practice calibrating sprayers for turf areas and other open field areas where chemical application rates are specified on an area basis (E7.9.2).
3. Have students practice techniques for thorough and uniform spray application to greenhouse and outdoor crops when chemical rates are on a concentration basis (E7.9.1-E7.9.7).
4. Compare application techniques and effectiveness of dusting versus spraying or granule application (E7.9.6).
5. Have students study training materials and take test for Private Pesticide Applicator's Certification as administered by the Virginia Department of Agriculture and Consumer Services (E7.9.1-E7.9.7).

SELECTED TOOLS AND MATERIALS

Dusting equipment
Herbicide
Protective clothing
Sprayer

SELECTED AUDIOVISUAL MATERIALS

Film: Be a Pro with Pesticides. Cornell University. Available from Virginia Cooperative Extension Service.
How to Safely Use Sprays and Dusts on Plants. American Institute of Biological Sciences. Prentice-Hall Media.
Filmstrip/Cassette: Pesticides: Safe Handling and Use. Bergwall Productions.

SELECTED REFERENCES

Turfgrass Maintenance Workers. V-TECS. Performance Objectives 18 and 17.
Applying Pesticides, Management, Application, Safety. AAVIM.
Pesticide Applicator Certification Training Manual, pp. 45-75. Virginia Cooperative Extension Service.

DUTY AREA

7. CONTROLLING PESTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

7.10 Identify and report spray damage

COURSE

Horticulture III (8034)

7.10

PERFORMANCE OBJECTIVE

P7.10 Given a pencil and pad, a bed of flowers growing in the greenhouse or in an open field area, a portion of which have been damaged by spray, identify that portion of the bed which has been damaged by spray, and write a report describing the damage. In no case will the spray-damaged area be missed, and 8 out of 10 statements made in the written report must be verifiable as correct.

SELECTED ENABLING OBJECTIVES

E7.10.1 Identify characteristics of spray damage in contrast to damage resulting from drought or application of excessive amounts of fertilizer.

E7.10.2 Identify the bed to be examined for spray damage.

E7.10.3 Describe a spray-damaged area and report it in writing.

CRITERION-REFERENCED MEASURE

C7.10 All areas damaged by spray identified; written report contains at least 10 statements of which 8 are accurate in describing the spray damage.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Prepare a wall chart of spray materials used in the program and list tolerant or sensitive major plant groups grown in the greenhouse and lab (E7.10.1-E7.10.3).
2. Prepare a notebook of photographs of plants showing spray injury with records of material used and other conditions that resulted in the damage, and review with students (E7.10.1-E7.10.3).
3. Have students practice identifying, describing, and reporting spray damage (E7.10.3).

SELECTED TOOLS AND MATERIALS

Report forms
Spray damaged areas

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 64.
Pesticide Applicator Certification Training Manual, pp. 86-92. Virginia Cooperative Extension Service.

DUTY AREA

7. CONTROLLING PESTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

7.11 Control animal pests

COURSE

Horticulture III (8034)

7.11

PERFORMANCE OBJECTIVE

P7.11 Given poison bait and an area where rodents are to be eradicated, control animal pests by setting out poisoned bait. Bait must be placed not only where it will be conveniently accessible to rodents but also where it will not be eaten by cats, dogs, chickens, or other domestic animals. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E7.11.1 Identify area to be baited.

E7.11.2 List locations where the bait will be accessible only to rodents.

E7.11.3 Explain the necessity of disposing of dead rodents when found, and identify proper disposal sites.

E7.11.4 Describe and/or demonstrate other animal control methods such as netting, trapping, or repelling.

CRITERION-REFERENCED MEASURE

C7.11 Animal pests controlled by placing poisoned bait in area accessible to rodents but not to domestic animals; all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate various methods used to control rodents (E7.11.1-E7.11.3).
2. Discuss and employ cultural control methods such as bird netting, traps, fencing, and sight, sound, and odor repellents (E7.11.4).
3. Have students interview relatives and friends and compile a list of effective animal control techniques (E7.11.4).
4. Invite a resource person to speak to class about poison baits and the proper disposal of animals eradicated by this method (E7.11.3).

SELECTED TOOLS AND MATERIALS

Animal traps
Other pest control equipment as needed
Poison baits

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Applying Pesticides, Management, Application, Safety. AAVIM.
Floriculture Worker. V-TECS. Performance Objective 63.
Nursery Production. V-TECS. Performance Objective 38.
Pesticide Applicator Certification Training Manual. Virginia Cooperative Extension Service.
Working in Horticulture, pp. 179-182. Richardson and Moore.

DUTY AREA

7. CONTROLLING PESTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

7.12 Fumigate greenhouse

COURSE

Horticulture III (8034)

7.12

PERFORMANCE OBJECTIVE

P7.12 Given a greenhouse and the necessary equipment and supplies, fumigate the greenhouse. The fumigant must be applied according to manufacturer's specifications. All safety procedures must be followed.

SELECTED ENABLING OBJECTIVES

E7.12.1 Calculate area to be treated (in cubic feet).

E7.12.2 Select fumigant to be used.

E7.12.3 Prepare application of fumigant according to manufacturer's recommendation as stated in the application table.

E7.12.4 Seal off area to be treated.

E7.12.5 Place appropriate signs warning that fumigation is in progress.

E7.12.6 Air out greenhouse after the specified period.

E7.12.7 Outline all safety procedures.

CRITERION-REFERENCED MEASURE

C7.12 Greenhouse fumigated according to manufacturer's specifications with all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss purposes and methods of fumigation (E7.12.1-E7.12.7).
2. Explain hazards involved in use of toxic fumigation materials (E7.12.1-E7.12.7).
3. Have students observe a demonstration and then practice fumigating a greenhouse (E7.12.1-E7.12.7).
4. Review and emphasize safety precautions (E7.12.7).

SELECTED TOOLS AND MATERIALS

Manufacturer's specifications
Fumigants
Fumigating equipment
Safety protection equipment

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Greenhouse Operation and Management, pp. 362-367. Nelson.
Pesticide Applicator Certification Training Manual. Virginia Cooperative Extension Service.
Applying Pesticides, Management, Application, Safety. AAVIM.
Greenhouse Pest Conrol. Task Sheets (2219L). Ohio Curriculum Materials.

DUTY AREA

8. INSTALLING AND REGULATING ENVIRONMENTAL CONTROL SYSTEMS AND DEVICES

TASKS/COMPETENCIES

8.1 Set automatic devices to control greenhouse temperature, humidity, and ventilation

8.2 Control cold frame temperature

8.3 Install heating cables or mats

8.4 Install shade cloth

8.5 Install black cloth

8.6 Apply shading material to greenhouse covering

8.7 Install artificial lighting system

8.8 Regulate lighting system time clocks

8.9 Install automatic irrigation and fertilization system

8.10 Regulate automatic irrigation equipment

8.11 Pump water for irrigation

8.12 Raise or elevate bedwire

DUTY AREA

8. INSTALLING AND REGULATING ENVIRONMENTAL CONTROL SYSTEMS AND DEVICES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

8.1 Set automatic devices to control greenhouse temperature, humidity, and ventilation

COURSE

Horticulture IV (8036)

8.1

PERFORMANCE OBJECTIVE

P8.1 Given a range of temperature and humidity to be maintained in a greenhouse and thermostats connected to the air conditioning system, set automatic devices to control greenhouse temperature, humidity, and ventilation. The temperature and humidity must be brought within the prescribed ranges within 1 to 2 hours after adjustment.

SELECTED ENABLING OBJECTIVES

E8.1.1 Determine proper temperature, humidity, and ventilation levels for designated greenhouse crops.

E8.1.2 Calculate heat loss in BTUs using the formula: Heat Loss = AxBxCxW.

E8.1.3 List and explain various methods used to regulate CO_2 levels in the greenhouse.

E8.1.4 List and explain various methods used to regulate relative humidity in the greenhouse.

E8.1.5 Calibrate thermostat with thermometers by adjusting thermostats to the correct temperature readings.

E8.1.6 Operate heaters, vents, fans, or air conditioning system to make certain that they can function properly.

E8.1.7 Demonstrate how to bring temperature to a reading within a specified acceptable range.

E8.1.8 Maintain the temperature within a specified temperature range.

E8.1.9 Maintain the humidity within a specified range.

CRITERION-REFERENCED MEASURE

C8.1 Automatic devices to control greenhouse temperature, humidity, and ventiliation set so that greenhouse temperature and humidity is within prescribed ranges within 1 to 2 hours.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss importance of controlling greenhouse temperatures, humidity, and ventilation (E8.1.1-E8.1.9).
2. Have students calculate heat loss for different areas (E8.1.2).
3. Provide a demonstration and discuss methods used to regulate CO_2 levels (E8.1.3).
4. Discuss importance of relative humidity and demonstrate how to operate automatic relative humidity control devices (E8.1.4).
5. Demonstrate how to operate automatic temperature control devices (E8.1.5).
6. Demonstrate how to regulate thermostats to establish various temperatures in a multi-compartment greenhouse (E8.1.5-E8.1.7).
7. Have students record and chart temperature and humidity at regular intervals over a period of days and at different seasons (E8.1.8).
8. Compare the effects of different temperature and humidity settings (E8.1.1-E8.1.9).
9. Conduct a field trip to a commercial greenhouse to observe automatic control of light, temperature, and humidity (E8.1.1-E8.1.9).

SELECTED TOOLS AND MATERIALS

Greenhouse climate control system
Thermometers
Thermostat
Humidistats

SELECTED AUDIOVISUAL MATERIALS

Slides: "Maintenance and Modification," Greenhouse Energy Management--Part I. Ohio Curriculum Materials.

SELECTED REFERENCES

Agricultural Lesson Plans: Controlling the Greenhouse Environment. Southern Illinois University at Carbondale.
The Ball Red Book, 12th ed. Ball.
Floriculture Worker. V-TECS. Performance Objective 39.
Greenhouse Operation and Management. Nelson.
Laboratory Manual of Electrical Controls Used in Agricultural Production, Exercises 9 and 10. Wilson and Bell.

Application

DUTY AREA

8. INSTALLING AND REGULATING ENVIRONMENTAL CONTROL SYSTEMS AND DEVICES

TASK / COMPETENCY

8.2 Control cold frame temperature

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

8.2

PERFORMANCE OBJECTIVE

P8.2 Given a cold frame, thermostats, thermometer, and a specified temperature range at which the cold frame is to be maintained, control cold frame temperature. Temperature in the cold frame must be maintained to the range specified in instructor-provided guidelines.

SELECTED ENABLING OBJECTIVES

E8.2.1 Demonstrate how to operate cold frame temperature controls.

E8.2.2 Calibrate thermostat with the thermometer.

E8.2.3 Set controls to temperature specified.

E8.2.4 Make necessary adjustments to insure desired temperature.

CRITERION-REFERENCED MEASURE

C8.2 Cold frame temperature controlled in accordance with instructor-prepared guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Give demonstrations as needed on cold frame temperature control methods (E8.2.1-E8.2.4).
2. Have students practice calibrating cold frame thermostat with a thermometer (E8.2.2).
3. Have students practice checking cold frame temperatures and making necessary adjustments for desired temperature conditions (E8.2.1-E8.2.4).

SELECTED TOOLS AND MATERIALS

Cold frame
Cold frame temperature control system
Thermometer
Handout: Instructor-prepared guidelines

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenouse, pp. 44-45. Boodley.
Ornamental Horticulture, p. 115. McDaniel.
Plant Progagation, Principles, and Practices, 4th ed., pp. 26-27. Hartmann and Kester.

Application

DUTY AREA

8. INSTALLING AND REGULATING ENVIRONMENTAL CONTROL SYSTEMS AND DEVICES

TASK / COMPETENCY

8.3 Install heating cables or mats

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

8.3

PERFORMANCE OBJECTIVE

P8.3 Given a properly grounded heating cable or mat, a thermostatic device, a hot bed or propagation unit, and the necessary tools and equipment, install the heating cable or mat. Heating cable must be installed according to safety standards, and temperature must be accurate to ± 3 degrees.

SELECTED ENABLING OBJECTIVES

E8.3.1 Define bottom heat and list at least two advantages in using it.

E8.3.2 Outline procedure for installing heating cable.

E8.3.3 Identify all safety procedures.

CRITERION-REFERENCED MEASURE

C8.3 Heating cables or mats installed in accordance with all safety standards and temperature accurate ± 3 degrees.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students review trade journals and supplier catalogs and prepare a report on bottom heating methods (E8.3.1).
2. Demonstrate the installation of heating cables or heat mats in the greenhouse bed used for propagation (E8.3.1-E8.3.3).
3. Demonstrate the installation of cables to convert a cold frame to a hot bed (E8.3.1-E8.3.3).

SELECTED TOOLS AND MATERIALS

Plan for hot bed construction
Heating cable or mat
Hot bed or propagating bed in greenhouse
Thermostat
Thermometer (soil)
Growing media or propagating mix
Equipment installation and use manual
Supplier catalogs

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Plant Propagation, Principles, and Practices, 4th ed., pp. 25-26. Hartmann and Kester.
50 Laboratory Exercises for Vocational Ornamental Horticulture Plants, pp. 141-143. Hemp.

Application

DUTY AREA

8. INSTALLING AND REGULATING ENVIRONMENTAL CONTROL SYSTEMS AND DEVICES

TASK / COMPETENCY

8.4 Install shade cloth

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

8.4

PERFORMANCE OBJECTIVE

P8.4 Given one or more benches or beds with growing plants, black cloth, support wires, and all other essential equipment and materials, install shade cloth to regulate photoperiod. The shade cloth, when installed, must eliminate all but 2 foot candles of the light during the regulated time period. Also, shade cloth must be installed in such a way that it can be easily removed and replaced.

SELECTED ENABLING OBJECTIVES

E8.4.1 Identify the shadehouse or other area to be covered and the purpose of installation.

E8.4.2 Check support wires and the framework of the superstructure over which shade cloth is to be installed to make sure all is in readiness.

E8.4.3 Determine the best methods to use in installation process: pig rings, grommets, or other means.

E8.4.4 Determine the specific measurements of the area.

E8.4.5 Explain need to allow for necessary overlap when cutting the required length or lengths of shade cloth from roll or bolt to meet requirements.

E8.4.6 Clean tools and equipment and return to storage.

CRITERION-REFERENCED MEASURE

C8.4 Shade cloth installed to eliminate all but 2 foot candles of light and in such a way that it can be easily removed and replaced.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss or provide illustrations of the effects of too much sunlight on various plants (E8.4.1).
2. Display types of shade cloth and discuss and/or demonstrate various installation procedures (E8.4.2-E8.4.6).
3. Demonstrate how to measure light in foot candles (E8.4.4).
4. Have students practice installing and removing shade cloth (E8.4.1-E8.4.6).
5. Compare the effects of different periods of light and darkness on plants (E8.4.1-E8.4.6).

SELECTED TOOLS AND MATERIALS

Supporting wire
Wire cutters
Saran, muslin, or other shade fabric

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Working in Horticulture, pp. 230-231. Richardson and Moore.

DUTY AREA

8. INSTALLING AND REGULATING ENVIRONMENTAL CONTROL SYSTEMS AND DEVICES

TASK/COMPETENCY

8.5 Install black cloth

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

8.5

PERFORMANCE OBJECTIVE

P8.5 Given one or more benches or beds with growing plants, black cloth, support wires, and all other essential equipment and materials, install black cloth and cover plants to regulate the photoperiod. The black cloth, when installed, must eliminate all but 2 foot candles of the light during the regulated time period. Also, black cloth must be installed in such a way that it can be easily removed and replaced.

SELECTED ENABLING OBJECTIVES

E8.5.1 Determine which width of black cloth is required and select appropriate width.

E8.5.2 Check support wires to make certain that they are satisfactory and that there are no sharp edges that might snap the cloth or interfere with the covering and uncovering of the plants.

E8.5.3 Roll out black cloth over the wires and plants.

E8.5.4 Tighten cloth enough to prevent sagging and exclude light.

E8.5.5 Use clothes pins, clips, and weights, if necessary, to secure ends and corners of the cloth.

E8.5.6 Return tools and unused cloth or other materials to their proper place for storage.

E8.5.7 Remove cloth after regulated time period, replacing the same as required.

CRITERION-REFERENCED MEASURE

C8.5 Black cloth installed, covering plants and eliminating all but 2 foot candles of light, and installed in such a way that cloth can be easily removed and replaced.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Grow one or more crops requiring long nights (E8.5.1-E8.5.7).
2. Demonstrate effects of shading and non-shading (E8.5.1-E8.5.7).
3. Have students observe a demonstration on installation and removal of a black cloth (E8.5.1-E8.5.7).
4. Have students install and remove a black cloth (E8.5.1-E8.5.7).
5. Review study of measuring light in foot candles (E8.5.1-E8.5.7).

SELECTED TOOLS AND MATERIALS

Black cloth
Fasteners
Light meter
Support wires
Weights

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 36.

DUTY AREA

8. INSTALLING AND REGULATING ENVIRONMENTAL CONTROL SYSTEMS AND DEVICES

TASK / COMPETENCY

8.6 Apply shading material to greenhouse covering

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

8.6

PERFORMANCE OBJECTIVE

P8.6 Given the specified foot candle requirements, light meter, sprayer, and a glass greenhouse on which shading compound is to be applied, apply shading material to greenhouse covering. Successive coats of shading compound are to be applied uniformly to obtain the required foot candle reading ± 10% on a clear day.

SELECTED ENABLING OBJECTIVES

E8.6.1 Explain purpose of shading materials used on greenhouse glass.

E8.6.2 Identify types of shading compounds.

E8.6.3 Demonstrate operation of spray equipment or paint roller and tray.

E8.6.4 Determine foot candle light requirements and apply compound as required to obtain the desired foot candle reading.

E8.6.5 Explain proper application of compound.

E8.6.6 Clean spray gun and other equipment used and return to storage.

E8.6.7 Describe shading material removal techniques.

CRITERION-REFERENCED MEASURE

C8.6 Shading material applied to greenhouse covering uniformly and obtaining the required foot candle reading ± 10% on a clear day.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss the benefits of using shade compound on greenhouse glass (E8.6.1).
2. Identify and describe the various materials that may be used as shade compounds (E8.6.2).
3. Demonstrate how to apply shading material (E8.6.3-E8.6.6).
4. Have students practice applying shading material to greenhouse glass (E8.6.3-E8.6.6).
5. Discuss and demonstrate reasons and techniques for removal of shade materials (E8.6.7).

SELECTED TOOLS AND MATERIALS

Compressed air sprayer
Greenhouse glass
Light meter
Paint roller and pan
Shading compound

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, p. 86. Boodley.
Floriculture Worker. V-TECS. Performance Objective 35.
Flower and Plant Production in the Greenhouse, p. 64. Nelson.

Application

DUTY AREA

8. INSTALLING AND REGULATING ENVIRONMENTAL CONTROL SYSTEMS AND DEVICES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

8.7 Install artificial lighting system

COURSE

Horticulture IV (8036)

8.7

PERFORMANCE OBJECTIVE

P8.7 Given a greenhouse bench or field bed, a specified foot candle reading to be attained, light bulbs, insulated electrical wire, clamp-on sockets, supports for the wires, and a light meter capable of measuring very low light intensities (0-50 foot candles), install an artificial lighting system by placing light bulbs at proper height and spacing to provide minimum specified foot candle of light on all areas of bench or bed. The specified light intensity will be verified by the use of a light meter. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E8.7.1 Erect supports for the wire.

E8.7.2 Put up wire. The wire should be fastened to the supports securely, with no sag between supports.

E8.7.3 Clamp sockets on wire at trial spacing. The sockets may need to be rearranged to provide the desired amount of light.

E8.7.4 Use light meter to measure foot candle at night or under black cloth at edges of bench or field.

E8.7.5 Readjust spacing or wattage of bulbs if a minimum of 10 foot candles is not being received at all points in the bench.

CRITERION-REFERENCED MEASURE

C8.7 Artificial lighting system installed at proper height and spacing to provide minimum specified foot candle of light in all areas of bench or bed. Specified light intensity verified by use of light meter. All safety procedures observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students grow a short day responsive crop such as chrysanthemum or poinsettia under light for maintenance in a vegetative state (E8.7.1-E8.7.5).
2. Have students grow a long day responsive crop such as marigold or petunia under light to induce flowering (E8.7.1-E8.7.5).
3. After a demonstration, have students practice installing lights for photoperiod control (E8.7.1-E8.7.5).
4. Show and discuss slides Electrical Wiring (E8.7.1-E8.7.5).

SELECTED TOOLS AND MATERIALS

Clamp-on sockets
Greenhouse bench or field bed
Insulated electrical wire
Light bulbs
Light meter
Wire supports

SELECTED AUDIOVISUAL MATERIALS

Slides or filmstrip: Electrical Wiring. AAVIM.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 37.

DUTY AREA

8. INSTALLING AND REGULATING ENVIRONMENTAL CONTROL SYSTEMS AND DEVICES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

8.8 Regulate lighting system time clocks

COURSE

Horticulture V (8038)

8.8

PERFORMANCE OBJECTIVE

P8.8 Given a specified floral crop, a specified time, functional time clocks, and an adequate artificial lighting system, regulate lighting system time clocks to provide the required duration of light within ± 5%. Lights must come on within 5 minutes of the time specified.

SELECTED ENABLING OBJECTIVES

E8.8.1 Determine critical night period for designated crops.

E8.8.2 Set time clock correctly to trigger the desired response.

E8.8.3 Determine the required lighting time for the crop based on critical night period less 5% and current day length.

E8.8.4 Verify proper light intensity for the crop(s).

E8.8.5 Check on and off times of the lights. Differences between the desired times and the actual cycling should never exceed 5 minutes. (Verify proper light intensity for the crops.)

CRITERION-REFERENCED MEASURE

C8.8 Lighting system time clocks regulated so that required duration of light is within ± 5%, and lights come on within 5 minutes of specified time.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss how to determine critical night period for different crops (E8.8.1).
2. Demonstrate how to set a time clock to trigger the desired response, how to determine the required lighting time for a crop based on critical night period less 5% and current day length, and how to check on and off times of a light (E8.8.2-E8.8.5).
3. Have students practice regulating time clocks for various crops (E8.8.1-E8.8.5).

SELECTED TOOLS AND MATERIALS

Artificial lighting system
Floral crop
Time clocks
Light meter

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objectives 38 and 52.
Laboratory Manual of Electrical Controls Used in Agricultural Production. Wilson and Bell.

Application

DUTY AREA

8. INSTALLING AND REGULATING ENVIRONMENTAL CONTROL SYSTEMS AND DEVICES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

8.9 Install automatic irrigation and fertilization system

COURSE

Horticulture V (8038)

8.9

PERFORMANCE OBJECTIVE

P8.9 Given a fertilizer proportioner unit, time clocks, solenoid valve, PVC pipe, and the necessary tools and equipment, install an automatic irrigation and fertilization system. When installed, the system will deliver the correct dilution of fertilizer as determined by the soluble salts meter, and there will be no leaks in the system. All plants will receive the correct amount of water/fertilizer solution.

SELECTED ENABLING OBJECTIVES

E8.9.1 Identify types, parts, and uses of different automatic irrigation systems: tube, drip, ooze spray, sprinkler, mat, or mist.

E8.9.2 List the parts of an irrigation system.

E8.9.3 Identify the area and irrigation system to be used.

E8.9.4 Demonstrate the assembly procedures to be followed.

E8.9.5 Install spaghetti system for hanging baskets.

E8.9.6 Install overhead spray system for bedding plants, pot crops, or cut flowers.

E8.9.7 Install a mist system.

E8.9.8 Install an overhead sprinkler system.

E8.9.9 Install a trickle system.

CRITERION-REFERENCED MEASURE

C8.9 Automatic irrigation and fertilization system installed with correct dilution of fertilizer delivered as determined by soluble salts meter and with no leaks in system. Correct amount of water/fertilizer solution received by all plants.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Assign appropriate readings and discuss types, uses, and construction of various automatic irrigation and fertilization systems (E8.9.1-E8.9.2).

2. Demonstrate or explain how to install the following types of systems (E8.9.4-E8.9.9):
   a. Spaghetti tube system for hanging baskets.
   b. Overhead spray system for bedding plants, pot crops, or cut flower crops.
   c. Mist system.
   d. Overhead sprinklers in the shadehouse and nursery.
   e. Trickle system in fruit and vegetable plots.

3. Have students install designated irrigation/fertilization systems, if available (E8.9.1-E8.9.9).

4. Visit commercial greenhouse to observe the operation of an irrigation/fertilization system (E8.9.1-E8.9.9).

SELECTED TOOLS AND MATERIALS

Irrigation system parts, as appropriate
Fertilizer proportioner

SELECTED AUDIOVISUAL MATERIALS

Filmstrips/Cassettes: Irrigation Series. Bergwall Productions.

SELECTED REFERENCES

Greenhouse Operation and Management, pp. 207-227. Nelson.
Planning for an Irrigation System. AAVIM.

DUTY AREA

8. INSTALLING AND REGULATING ENVIRONMENTAL CONTROL SYSTEMS AND DEVICES

TASK / COMPETENCY

8.10 Regulate automatic irrigation equipment

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture V (8038)

8.10

PERFORMANCE OBJECTIVE

P8.10 Given an automatic irrigation system and instructor-prepared guidelines, regulate automatic irrigation equipment to apply water uniformly for the crop being irrigated. The plants must be uniformly watered with the specified amount required.

SELECTED ENABLING OBJECTIVES

E8.10.1 Explain key terms and concepts related to irrigation.

E8.10.2 Identify principles of operation of various automatic irrigation systems: tube, drip, ooze, spray, sprinkler, mist.

E8.10.3 Test system for uniform water application (leaks, clogged lines).

E8.10.4 Demonstrate operation of system valves on regulators (time clocks, solenoids).

E8.10.5 Measure amounts of water applied to determine proper timing of irrigation.

E8.10.6 Explain how to check crop for areas that are over and under watered.

E8.10.7 Take soil moisture readings.

E8.10.8 Identify and report malfunctions of automatic irrigation and fertilization systems.

CRITERION-REFERENCED MEASURE

C8.10 Automatic irrigation equipment regulated to apply water uniformly, in accordance with instructor-prepared guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students review basic principles of irrigation and soil, water, and plant relationships (E8.10.1, E8.10.2).
2. Set up and demonstrate how to regulate and use various automatic irrigation systems for greenhouse, nursery, fruit, and vegetable crops (E8.10.1-E8.10.8).
3. Have students visit horticultural businesses that employ automated irrigation and fertilization systems (E8.10.1-E8.10.8).
4. Demonstrate how to take soil moisture readings (E8.10.7).
5. Have students regulate available irrigation systems (E8.10.1-E8.10.8).

SELECTED TOOLS AND MATERIALS

Automatic irrigation system
Dye
Clear glass bottle
Time clock
Moisture probe
Handout: Instructor-prepared guidelines

SELECTED AUDIOVISUAL MATERIALS

Filmstrips/Cassettes: Irrigation Series. Bergwall Productions.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objectives 47, 48, 52, and 53.
Nursery Production--A Student Handbook, pp. 154-157. Pennsylvania State University.
Planning for an Irrigation System. AAVIM.

DUTY AREA

8. INSTALLING AND REGULATING ENVIRONMENTAL CONTROL SYSTEMS AND DEVICES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

8.11 Pump water for irrigation

COURSE

Horticulture V (8038)

8.11

PERFORMANCE OBJECTIVE

P8.11 Given a well, lake, or other adequate source of irrigation water and an irrigation supply pump, pump water for irrigation. Pump must be started and operated in accordance with the instructions contained in the operator's manual.

SELECTED ENABLING OBJECTIVES

E8.11.1 Make the necessary service checks to ensure the smooth and safe operation of the pump.

E8.11.2 Start motor and operate the pump. It may be necessary to prime the pump if the pump is not self-priming.

E8.11.3 Return all unused service material and equipment to storage.

CRITERION-REFERENCED MEASURE

C8.11 Water pumped for irrigation in accordance with instructions contained in operator's manual.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Arrange for class to visit a horticulture business that relies on a well or pond for irrigation water (E8.11.1-E8.11.3).
2. Review operator's manual with students and discuss (E8.11.1, E8.11.2).
3. Demonstrate how to prime a pump (E8.11.2).
4. Have students pump water for irrigation (E8.11.1-E8.11.3).

SELECTED TOOLS AND MATERIALS

Irrigation supply pump
Well or other water supply source
Operator's manual

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Pumping Plants. Bergwall Productions.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 54.
Planning for an Irrigation System. AAVIM.

DUTY AREA

8. INSTALLING AND REGULATING ENVIRONMENTAL CONTROL SYSTEMS AND DEVICES

TASK / COMPETENCY

8.12 Raise or elevate bedwire

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture V (8038)

8.12

PERFORMANCE OBJECTIVE

P8.12 Given a pair of pliers, tie wire, a flower crop growing in a greenhouse or shadehouse, bedwire in place and a specified height to which it is to be raised, elevate the bedwire to the new level. The bedwire must be raised to the prescribed level ± 1/2 inch, and be well secured, and no more than 0.01% of the growing plants are to be injured in the process.

SELECTED ENABLING OBJECTIVES

E8.12.1 Loosen ties or hanger brackets where bedwire is secured to the posts or steel support stakes at the ends of the bed.

E8.12.2 Loosen, raise, and reattach one side of the bedwire at the desired height.

E8.12.3 Loosen, raise, and reattach other side of the bedwire so that it will be level with the opposite side.

E8.12.4 Raise and reattach the ends of the bedwire to correspond with the sides.

E8.12.5 Return pliers and unused materials to their appropriate places.

CRITERION-REFERENCED MEASURE

C8.12 Bedwire raised or elevated to ± 1/2 inch of specified height, properly secured, with no more than .01% of growing plants injured in the process.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss with students purposes for elevating bedwire (E8.12.1-E8.12.5).
2. Grow a cut flower crop, such as crysanthemum, snapdragon, or carnation which commonly employ bedwire support (E8.12.1-E8.12.5).
3. Have students practice raising or elevating bedwire (E8.12.1-E8.12.5).

SELECTED TOOLS AND MATERIALS

Bedwire
Floral crop
Pliers
Tie wire
Measuring device

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 44.
Flower and Plant Production in the Greenhouse, pp. 141-152. Nelson.

DUTY AREA

9. HARVESTING CROPS

TASKS/COMPETENCIES

9.1 Inventory plants

9.2 Pot plants for sale

9.3 Label plants for sale

9.4 Groom plants for sale

9.5 Grade plants and flowers

9.6 Cull unsaleable greenhouse plants and flowers

9.7 Select and remove saleable plants from beds or benches

9.8 Load and move plants or flowers to packing area or house

9.9 Cut flowers

9.10 Count and bunch flowers

9.11 Prepare and place flowers in water or preservatives

9.12 Prepare and place cut flowers in storage

9.13 Top and dig bulbs or corms

9.14 Dig up trees and shrubs

9.15 Ball and burlap trees and shrubs

9.16 Remove bedwire from harvested crops

9.17 Cut and stack sod

Application

DUTY AREA

9. HARVESTING CROPS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

9.1 Inventory plants

COURSE

Horticulture IV (8036)

9.1

PERFORMANCE OBJECTIVE

P9.1 Given necessary inventory sheets and assorted greenhouse or nursery plants to be inventoried, inventory the plants according to variety, size, and container size. All plants must be listed and classified as to variety. The count must agree with that taken by the instructor.

SELECTED ENABLING OBJECTIVES

E9.1.1 Identify common varieties of greenhouse, nursery, and field-grown plants.

E9.1.2 Explain importance of crop inventories.

E9.1.3 Prepare inventory sheet in advance and place it on a clipboard so that it will be accessible for ready use.

E9.1.4 Count and record actual number of plants in each category according to variety, quantity, container size, etc., proceeding systematically.

E9.1.5 Total each category to obtain a final count.

CRITERION-REFERENCED MEASURE

C9.1 Plants inventoried according to variety, size, and container size; totals agree with instructor's inventory control count.

INVENTORY SHEET 9.1

DUTY: HARVESTING CROPS

TASK: Inventory plants

INVENTORY SHEET FOR A FLORICULTURE OPERATION

Variety	Quantity	Container Size	Size & # of Plants per pots	Plant Condition

Source: Floriculture Worker. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Develop a comprehensive inventory program of all nursery, floral, and other crops being grown for sale (E9.1.1-E9.1.5).
2. Discuss importance of inventory procedures and explain relationship of inventories to effective cost accounting (E9.1.1-E9.1.5).
3. Have students practice using inventory sheets and record book (E9.1.3-E9.1.5).

SELECTED TOOLS AND MATERIALS

Handout: Inventory Sheet
Inventory forms
Plants

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 85.
Nursery Production. V-TECS. Performance Objective 59.
Retail Florist, Teacher's Guide, pp. 5-14. Illinois Office of Education.

DUTY AREA

9. HARVESTING CROPS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

9.2 Pot plants for sale

COURSE

Horticulture IV (8036)

9.2

PERFORMANCE OBJECTIVE

P9.2 Given instructor's demonstration, ten plants of various sizes, and necessary equipment and supplies, pot the plants. The plants will be potted in a predetermined size container and depth in accordance with instructor demonstration.

SELECTED ENABLING OBJECTIVES

E9.2.1 Identify anticipated dates of sale of plants to be potted.

E9.2.2 List characteristics of healthy and unhealthy roots.

E9.2.3 State symptoms of pot-bound plants.

E9.2.4 Determine proper container size.

E9.2.5 Identify appropriate potting medium for plants to be potted.

E9.2.6 Fill pots with media.

E9.2.7 Set the plants in the container at the proper level.

E9.2.8 Line out or place pots in area to grow.

CRITERION-REFERENCED MEASURE

C9.2 Plants potted for sale in predetermined size container and to specified depth in accordance with instructor demonstration.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss factors that determine selection of sale dates for mature and immature plants (E9.2.1).
2. Discuss importance of selecting plants with healthy roots. Demonstrate how to examine roots to determine amount of root formation, condition and color of roots, and presence and amount of root hairs (E9.2.2).
3. Demonstrate how to determine the proper pot size and growing medium for assorted types and sizes of foliage plants (E9.2.3-E9.2.5).
4. Show several pot-bound plants, and discuss the symptoms that plants exhibit when pot-bound (E9.2.3).
5. Have students practice potting various types and sizes of foliage plants (E9.2.1-E9.2.8).

SELECTED TOOLS AND MATERIALS

Assorted pots
Growing medium
Potted foliage plants

SELECTED AUDIOVISUAL MATERIALS

Filmstrips: Gardening Fundamentals, Preparing Stock for Planting, and Putting it in the Ground. Prentice-Hall Media.
Houseplants Part II. Photocom Productions.

SELECTED REFERENCES

Agricultural Lesson Plans: Foliage Plants, p. 9. Southern Illinois University at Carbondale.
Greenhouse Grow How, p. 97. Pierce.
Horticulture: A Basic Awareness, pp. 65-70. Baudendistel.
Introductory Horticulture, pp. 90-91. Reiley and Shry.
Nursery Production. V-TECS. Performance Objective 50.
Ornamental Horticulture, pp. 122-123. McDaniel.
Working in Horticulture, pp. 136-138. Richardson and Moore.

Application

DUTY AREA

9. HARVESTING CROPS

TASK / COMPETENCY

9.3 Label plants for sale

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

9.3

PERFORMANCE OBJECTIVE

P9.3 Given plants in pots and/or in flats and the required labels, label the plants. Writing on all labels must be clear and legible. Plants should be arranged in the back of and to the right of the labels.

SELECTED ENABLING OBJECTIVES

E9.3.1 Identify common greenhouse and nursery plants and flowers.

E9.3.2 Demonstrate how to interpret botanical keys and plants species identification charts and guides.

E9.3.3 Print labels legibly in pencil or indelible ink, indicating the relevant information for a particular species.

CRITERION-REFERENCED MEASURE

C9.3 Plants labeled correctly, clearly, and arranged so that plants identified are in the back of and to the right of labels.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review study of labeling plants and cuttings, Task 5.7 (E9.3.1, E9.3.3).
2. Have students practice identifying common foliage and bedding plants, using charts, guides, and/or botanical keys (E9.3.1).
3. Demonstrate procedure for labeling plants in pots and in flats (E9.3.3).
4. Have students label plants for a sale (E9.3.1-E9.3.3).

SELECTED TOOLS AND MATERIALS

Assorted plants
Botanical keys
Flats
Labels
Pencil or indelible ink pen
Plant identification charts and guides

SELECTED AUDIOVISUAL MATERIALS

Slides: Learning the Landscape: A Slide Guide to Ornamental Plants. PhotoCom.

SELECTED REFERENCES

Agricultural Lesson Plans: Bedding Plants and Foliage Plants. Southern Illinois University at Carbondale.
Floriculture Worker. V-TECS. Performance Objective 28.
Nursery Production. V-TECS. Performance Objective 49.
Working in Horticulture, pp. 55-70. Richardson and Moore.

— Application —

DUTY AREA

9. HARVESTING CROPS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

9.4 Groom plants for sale

COURSE

Horticulture IV (8036)

9.4

PERFORMANCE OBJECTIVE

P9.4 Given greenhouse or nursery grown plants and necessary equipment and supplies, groom plants for sale in accordance with criteria specified in instructor-prepared guidelines.

SELECTED ENABLING OBJECTIVES

E9.4.1 Check plants for saleable size as per industry standards.

E9.4.2 Check plants for form or shape.

E9.4.3 Check plants for disease or insects.

E9.4.4 Remove dead or diseased plant parts on sale plants.

CRITERION-REFERENCED MEASURE

C9.4 Plants groomed for sale in accordance with instructor-prepared guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students participate in a discussion of plant size, form or shape, texture and color of foliage (E9.4.1-E9.4.4).
2. Demonstrate how to groom plants for sale (E9.4.1-E9.4.4).
3. Have students practice grooming plants for sale (E9.4.1-E9.4.4).

SELECTED TOOLS AND MATERIALS

Greenhouse plants
Handout: Instructor-prepared guidelines

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

"Designing and Care of Flowers and Foliages," Retail Floriculture Book II. Ohio Curriculum Materials.
A Manual for Flower Judging. Ohio Curriculum Materials.
National FFA Floriculture Contest Study Guide. Ohio Curriculum Materials.
Retail Florist, Teacher's Guide, pp. 61-99. Illinois Office of Education.

DUTY AREA

9. HARVESTING CROPS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

9.5 Grade plants and flowers

COURSE

Horticulture IV (8036)

9.5

PERFORMANCE OBJECTIVE

P9.5 Given 4 or 5 dozen potted foliage or floral plants or 100 cut carnations, grade the plants or flowers. At least 90% of the plants or flowers graded must conform to the grading standards adopted by Pi Alpha Xi, the National Honorary Fraternity in Floriculture and Ornamental Horticulture.

SELECTED ENABLING OBJECTIVES

E9.5.1 Identify plants and flowers to be graded.

E9.5.2 Identify the grades and standards for judging as contained in Pi Alpha Xi publications.

E9.5.3 Establish a mental image for the perfect model or ideal plant.

E9.5.4 Compare plants to be graded to the model.

E9.5.5 Place or grade the plants in accordance with the mental image of the ideal or model.

CRITERION-REFERENCED MEASURE

C9.5 Plants or flowers graded with at least 90% conforming to grading standards adopted by Pi Alpha Xi.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Explain grades and standards for judging as contained in Pi Alpha Xi publications (E9.5.1, E9.5.2).
2. Have students participate in local, area, or state Future Farmers of America horticulture judging contests (E9.5.1-E9.5.5).
3. Have students visit a wholesale florist (E9.5.1-E9.5.5).
4. Have students practice grading plants and flowers (E9.5.1-E9.5.5).

SELECTED TOOLS AND MATERIALS

Cut flowers (carnations) and/or flowering/foliage plants
Grading standards adopted by Pi Alpha Xi

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objectives 78 and 79.
A Manual for Flower Judging. Kalin. Pi Alpha Xi Collegiate Honorary Fraternity and the Department of Horticulture. Washington State University.

DUTY AREA

9. HARVESTING CROPS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

9.6 Cull unsaleable greenhouse plants and flowers

COURSE

Horticulture IV (8036)

9.6

PERFORMANCE OBJECTIVE

P9.6 Given a group of plants or cut flowers in the greenhouse, cull unsaleable plants or flowers by removing and discarding those which are diseased, damaged, malformed, or too mature for sale through a retailer. No more than 10% will be overlooked.

SELECTED ENABLING OBJECTIVES

E9.6.1 List common diseases of greenhouse plants.

E9.6.2 State market standards of potted plants and cut flowers.

E9.6.3 Define bull-headed, split, crook-neck, botrytis.

CRITERION-REFERENCED MEASURE

C9.6 Unsaleable greenhouse plants and flowers culled with no more than 10% of diseased, damaged, malformed, or too mature plants overlooked.

SELECTED INSTRUCTIONAL ACTIVITIES

1. List and discuss symptoms of common diseases of greenhouse plants (E9.6.1).
2. Discuss market standards (E9.6.2).
3. Arrange for students to visit a commercial greenhouse or wholesaler to observe sale preparation procedures (E9.6.1-E9.6.3).
4. Have students practice culling unsaleable greenhouse plants and flowers (E9.6.1, E9.6.2).

SELECTED TOOLS AND MATERIALS

Selected plants or flowers

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 71.
A Manual for Flower Judging. Kalin. Pi Alpha Xi Collegiate Honorary Fraternity and the Department of Horticulture. Washington State University.
National FFA Floriculture Contest Study Guide. Ohio Curriculum Materials.

DUTY AREA

9. HARVESTING CROPS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

9.7 Select and remove saleable plants from beds or benches

COURSE

Horticulture IV (8036)

9.7

PERFORMANCE OBJECTIVE

P9.7 Given a collection of saleable and unsaleable potted plants, select those plants that are saleable and remove them from the beds or benches. All of the plants removed must be saleable, and no more than 10% of the saleable plants will be overlooked.

SELECTED ENABLING OBJECTIVES

E9.7.1 Examine market order.

E9.7.2 State the standard for marketable plants of a particular species.

E9.7.3 Collect the required number of saleable plants and remove them from the others.

CRITERION-REFERENCED MEASURE

C9.7 Saleable plants selected and removed from collection. All plants removed saleable, and no more than 10% of saleable plants overlooked.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students discuss an order and decide the standard for marketable plants of a particular species (E9.7.1, E9.7.2).

2. Have students collect the required number of saleable plants and remove them from the others (E9.7.3).

SELECTED TOOLS AND MATERIALS

Market orders for plants
Collection of plants

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 71.
A Manual for Flower Judging. Kalin.
National FFA Floriculture Contest Study Guide. Ohio Curriculum Materials.
Ornamental Horticulture, pp. 152-173. McDaniel.

DUTY AREA

9. HARVESTING CROPS

TASK / COMPETENCY

9.8 Load and move plants or flowers to packing area or house

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

9.8

PERFORMANCE OBJECTIVE

P9.8 Given potted plants and a greenhouse cart, truck, or other suitable conveyance, load the plants and move to the packing/loading area. Plants must be closely packed and arranged according to size so that none will be damaged in hauling.

SELECTED ENABLING OBJECTIVES

E9.8.1 Identify all plants to be loaded and hauled.

E9.8.2 Determine best plan for loading.

E9.8.3 List guidelines for loading packaged or crated plants.

E9.8.4 Secure shipment with rope, if necessary.

E9.8.5 Secure large, single potted plants, or boxes and crates as necessary to prevent shifting.

E9.8.6 Close and secure gates on loaded truck.

CRITERION-REFERENCED MEASURE

C9.8 Plants or flowers loaded correctly according to size and moved to packing area or house without any damage to plants or flowers.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with plants to be loaded and hauled (E9.8.1).
2. Discuss and demonstrate techniques for proper loading and hauling of plants and flowers (E9.8.2-E9.8.6).
3. Have students practice loading and hauling plants and flowers (E9.8.1-E9.8.6).

SELECTED TOOLS AND MATERIALS

Flats and/or boxes
Greenhouse cart
Potted plants
Rope
Truck

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 70.

—— Application ——

DUTY AREA
9. HARVESTING CROPS

PROGRAM
HORTICULTURE (01.0601)

TASK / COMPETENCY
9.9 Cut flowers

COURSE
Horticulture IV (8036)

9.9

PERFORMANCE OBJECTIVE

P9.9 Given the appropriate containers and conveyance for hauling, a cut flower crop to be harvested, and a cutting knife for harvesting, cut the flowers. Flowers must be at late bud or early bloom stage of development, free from diseases and physical damage, and meeting market requirements. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E9.9.1 Identify special requirements and grade specifications.

E9.9.2 Identify the particular beds or field areas from which flowers are to be harvested.

E9.9.3 Identify flowers in late bud or early bloom stage of development.

CRITERION-REFERENCED MEASURE

C9.9 Flowers cut at late bud or early bloom stage of development, free from diseases and physical damage, and meeting market requirements; all safety procedures observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate proper method to harvest cut flowers (E9.9.3).
2. Invite a local nursery or greenhouse owner to discuss grade specifications concerning certain flower varieties (E9.9.1).
3. Have students cut flowers from a specified crop of flowers which are at late bud or early bloom stage of development (E9.9.1-E9.9.3).

SELECTED TOOLS AND MATERIALS

Cut flower containers
Cut flower harvest baskets
Flower cutting knife
Greenhouse cart/truck

SELECTED AUDIOVISUAL MATERIALS

Filmstrips: Care and Handling of Cut Flowers. Photocom Productions.
Care and Handling of Cut Flowers and Foliage. Vocational Education Productions.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 67.
Ornamental Horticulture, pp. 63, 68-82. McDaniel.

DUTY AREA

9. HARVESTING CROPS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

9.10 Count and bunch flowers

COURSE

Horticulture IV (8036)

9.10

PERFORMANCE OBJECTIVE

P9.10 Given the flowers, standards to be followed in counting and bunching, and the necessary materials, count and bunch the flowers. The count must be 100% accurate and stems must be pointing in the same direction and of uniform length when placed in the bunch. Bunches must be firmly bound together by double or triple wrapping with a rubber band.

SELECTED ENABLING OBJECTIVES

E9.10.1 Describe prescribed standards for counting and bunching.

E9.10.2 Identify flowers to be counted and bunched.

CRITERION-REFERENCED MEASURE

C9.10 Flowers counted and bunched in accordance with prescribed standards. Count must be 100% accurate, stems pointing in same direction and of uniform length when placed in bunch. Bunches firmly bound together with double or triple wrapping with rubber band.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students discuss prescribed standards for counting and bunching flowers (E9.10.1).
2. Have students count and bunch flowers in accordance with standards (E9.10.1, E9.10.2).

SELECTED TOOLS AND MATERIALS

Rubber bands
Stem cutter
Stem length scale

SELECTED AUDIOVISUAL MATERIALS

Filmstrips: Care and Handling of Cut Flowers. Photocom Productions.
Care and Handling of Cut Flowers and Foliage. Vocational Education Productions.
Slides: Flower Identification Slide Set Series. Vocational Education Productions.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 68.
Ornamental Horticulture, p. 63. Richardson and Moore.

Application

DUTY AREA

9. HARVESTING CROPS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

9.11 Prepare and place flowers in water or preservatives

COURSE

Horticulture IV (8036)

9.11

PERFORMANCE OBJECTIVE

P9.11 Given the required solution, vats or other suitable containers, a pair of shears, flowers to be prepared, and water or other preservative solution, prepare the flowers and place them in the water or preservatives. Stems of the flowers will be freshly cut to a uniform length, and the solution will not cover less than 1/3 nor more than 1/2 the length of the flower stems. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E9.11.1 State type of stem treatment needed for designated cut flowers and design greens.

E9.11.2 Prepare preservation solutions.

E9.11.3 Remove all unsuitable floral specimens and discard.

E9.11.4 Trim the stems so that all are freshly cut and approximately of the same length.

E9.11.5 Place flowers in the preservative which should be at or only slightly below room temperature.

E9.11.6 Clean the work area.

CRITERION-REFERENCED MEASURE

C9.11 Flowers prepared and placed in water or preservatives. Stems of flowers freshly cut and of uniform length; solution does not cover less than 1/3 nor more than 1/2 of length of flower stems. All safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Describe type of stem treatment needed for various types of cut flowers and design greens (E9.11.1).
2. Demonstrate how to prepare preservative solutions (E9.11.2).
3. Discuss reasons why diseased or malformed flowers are not placed in the preservative (E9.11.3).
4. Have students use dividers or racks to prevent flowers from falling down and becoming submerged in the preservative (E9.11.5).
5. Have students demonstrate how to prepare and place flowers correctly in a preservative (E9.11.3-E9.11.6).

SELECTED TOOLS AND MATERIALS

Floral refrigerator vases
Measuring tools, such as measuring spoons and/or a small scale
Preservative solution
Several different types of cut flowers and design greens
Shears
Containers

SELECTED AUDIOVISUAL MATERIALS

Filmstrips: Care and Handling of Cut Flowers. Photocom Productions.
Care and Handling of Cut Flowers and Foliage. Vocational Education Productions.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 69.
Floral Design and Arrangement, pp. 60-67. McDaniel.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 3.

DUTY AREA

9. HARVESTING CROPS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

9.12 Prepare and place cut flowers in storage

COURSE

Horticulture IV (8036)

9.12

PERFORMANCE OBJECTIVE

P9.12 Given storage facilities and cut flowers to be placed in storage, prepare flowers and place them in storage. Preparatory to storage, flowers must be stemmed and placed in a container holding water or other preservative solution so that standards of quality can be maintained. No flowers are to be damaged in the process.

SELECTED ENABLING OBJECTIVES

E9.12.1 Identify the kinds of flowers that are to be stored.

E9.12.2 Identify storage needs for particular varities of flowers.

E9.12.3 Place flowers in storage.

CRITERION-REFERENCED MEASURE

C9.12 Flowers prepared by stemming and placing in container holding water or preservative solution; flowers stored with no damage.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review different storage requirements for various crops, including temperature and ethylene hazards (E9.12.1-E9.12.3).
2. Have students place designated flowers in storage (E9.12.1-E9.12.3).

SELECTED TOOLS AND MATERIALS

Containers
Flowers to be stored
Preservative solutions
Water

SELECTED AUDIOVISUAL MATERIALS

Filmstrip: Care and Handling of Cut Flowers and Foliage. Vocational Education Productions.

SELECTED REFERENCES

The Commercial Greenhouse, pp. 519-522. Boodley.
Ornamental Horticulture, pp. 255-257. McDaniel.

DUTY AREA

9. HARVESTING CROPS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

9.13 Top and dig bulbs or corms

COURSE

Horticulture IV (8036)

9.13

PERFORMANCE OBJECTIVE

P9.13 Given a field area of bulbs or corms to be harvested, a mowing machine, and bulb digging equipment, top and dig the bulbs or corms. All tops or above ground growth must be mowed, and no more than 2% of the bulbs or corms will be left in the field. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E9.13.1 List characteristics of a variety of field grown bulbs or corms.

E9.13.2 Identify field to be harvested.

E9.13.3 Service equipment as required.

E9.13.4 Mow tops of bulbs and corms to be harvested.

E9.13.5 Use bulb digger to dig up bulbs or corms.

E9.13.6 Remove bulbs or corms and all equipment from field.

E9.13.7 Clean and size the bulbs.

E9.13.8 Clean and store equipment.

E9.13.9 List and follow safety and handling precautions.

CRITERION-REFERENCED MEASURE

C9.13 Bulbs or corms topped and dug with no more than 2% left in the field, and tops or above ground growth mowed. All safety procedures observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss characteristics of a variety of field grown bulbs and corms (E9.13.1).
2. Grow a variety of bulb crops (e.g., tulip, daffodil, crocus, hyacinth, and lily) for use in harvesting, propagating, and forcing projects (E9.13.1, E9.13.2).
3. Have students dig and prepare bulbs or corms (E9.13.2-E9.13.9).

SELECTED TOOLS AND MATERIALS

Bulb digging equipment
Containers
Field grown bulbs or corms
Mowing machine

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objectives 72 and 73.

DUTY AREA

9. HARVESTING CROPS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

9.14 Dig up trees and shrubs

COURSE

Horticulture IV (8036)

9.14

PERFORMANCE OBJECTIVE

P9.14 Given plants to be dug and necessary equipment and supplies, dig up the tree or shrub. Dug plant must have a firm root ball of soil with no exposed or broken roots.

SELECTED ENABLING OBJECTIVES

E9.14.1 Outline and explain guidelines for digging up trees and shrubs.

E9.14.2 Make a trench around the plant.

E9.14.3 Pull loosened soil away from plant.

E9.14.4 Cut the ends of the roots.

E9.14.5 Lift ball of soil and plant from the hole.

CRITERION-REFERENCED MEASURE

C9.14 Trees or shrubs dug up; plant has firm root ball of soil with no exposed or broken roots.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Explain reasons a dug plant should have a firm root ball of soil with no exposed or broken roots (E9.14.1-E9.14.5).
2. Discuss those factors which allow some plants to be dug bare root (E9.14.1-E9.14.5).
3. Prepare lists of floral, nursery, fruit, and vegetable plants that do and do not tolerate bare-root digging (E9.14.1-E9.14.5).
4. Have students dig up and relocate shrubs (E9.14.1-E9.14.5).

SELECTED TOOLS AND MATERIALS

Shovels

SELECTED AUDIOVISUAL MATERIALS

Filmstrips: Hand Digging of Evergreens and Shrubs. Vocational Agricultural Service.
Mechanical Digging of Trees and Shrubs. Vocational Agricultural Service.

SELECTED REFERENCES

Nursery Production. V-TECS. Performance Objective 46.
Ornamental Horiculture, pp. 364-367. McDaniel.
Working in Horticulture, pp. 130-135. Richardson and Moore.

DUTY AREA

9. HARVESTING CROPS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

9.15 Ball and burlap trees and shrubs

COURSE

Horticulture IV (8036)

9.15

PERFORMANCE OBJECTIVE

P9.15 Given shrubs and trees and necessary equipment and supplies, ball and burlap the shrubs and trees. Upon completion, there must be no exposed roots or spillage of soil coming from the burlapped ball.

SELECTED ENABLING OBJECTIVES

E9.15.1 Outline digging steps.

E9.15.2 Check ball of soil on root system of shrub or tree to determine that it is firm and not broken.

E9.15.3 Wrap burlap tightly around ball of soil.

E9.15.4 Pin burlap with nails as it is being wrapped.

E9.15.5 Gather burlap around stalk or trunk of shrub or tree.

E9.15.6 Secure burlap around ball of soil with grass string and tie it off around the stalk or trunk of the shrub or tree.

CRITERION-REFERENCED MEASURE

C9.15 Shrubs or trees balled and burlapped with no exposed roots or spillage of soil from burlapped ball.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review study of digging up trees and shrubs (E9.15.1).
2. Have students ball and burlap shrubs and trees for relocation (E9.15.1-E9.15.6).
3. Have students dig smaller plants and place them in containers as an alternative used by some nurseries (E9.15.1-E9.15.6).

SELECTED TOOLS AND MATERIALS

Burlap
Large nails
Shovel/spade
Twine or grass string

SELECTED AUDIOVISUAL MATERIALS

Filmstrip: Balling and Burlapping Trees and Shrubs. Vocational Agricultural Service.

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 72.
Nursery Production. V-TECS. Performance Objective 45.
Ornamental Horticulture, pp. 364-367. McDaniel.
Working in Horticulture, pp. 130-133. Richardson and Moore.

DUTY AREA

9. HARVESTING CROPS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

9.16 Remove bedwire from harvested crops

COURSE

Horticulture IV (8036)

9.16

PERFORMANCE OBJECTIVE

P9.16 Given bedwire in a greenhouse or shadehouse flower bed from which crop has been harvested, remove the bedwire. All wire or string holding bedwire to stakes must be removed; bedwire must be rolled up into a compact roll and then removed from the bedding area without damage.

SELECTED ENABLING OBJECTIVES

E9.16.1 Identify the bed from which bedwire is to be removed.

E9.16.2 Remove all weeds, grass, and debris from bed.

E9.16.3 Remove string or wire securing bedwire to stakes.

E9.16.4 Roll up bedwire into a tightly compacted roll.

E9.16.5 Store bedwire properly for future use.

CRITERION-REFERENCED MEASURE

C9.16 Bedwire removed from harvested crops, rolled up in compact roll, and removed from bedding area without damage; all wire or string holding bedwire to stakes removed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss the purpose of bedwire (E9.16.1).
2. Have students practice removing weeds, grass, and debris from a bed (E9.16.2).
3. Have students practice removing bedwire from harvested crops (E9.16.1-E9.16.5).

SELECTED TOOLS AND MATERIALS

Bedwire
Harvested bedding area
Rakes or other tools required

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 44.
Flower and Plant Production in the Greenhouse, pp. 141-152. Nelson.

DUTY AREA

9. HARVESTING CROPS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

9.17 Cut and stack sod

COURSE

Horticulture IV (8036)

9.17

PERFORMANCE OBJECTIVE

P9.17 Given an area to be cut, a sod cutter, two standard pallets, and sod-size specifications, cut the sod in such a way that it will meet the purposes for which it is to be used and be ready to be stacked. Successive pieces and layers of sod must be overlapped and overlayered in such a way that slippage will not be a problem in loading the pallets or in transporting them on rough roads by truck. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E9.17.1 Perform the following sequenced job skills:
  a. Check oil level and lubrication of sod cutter.
  b. Level cutting bar and make other mechanical adjustments, if necessary.
  c. Cut sod to specifications.
  d. Clean sod cutter following use and return to storage.

E9.17.2 Perform the following sequenced job skills:
  a. Check the pallet to make sure it is solid and that there are no broken parts.
  b. Pick up sod, two pieces at a time, and lay them on pallet in a designated pattern, overlapping each successive layer.
  c. Check each stack of sod to make sure it is well balanced on the pallet.
  d. Remove sod and re-stack when necessary.

CRITERION-REFERENCED MEASURE

C9.17 Sod cut to specified size, and stacked so that successive pieces and layers overlap and overlayer to prevent slippage; all safety procedures observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate how to make necessary adjustments to a sod cutter, cut sod to specifications, and clean the sod cutter and return it to its proper place (E9.17.1).
2. Have students practice picking up sod two pieces at a time and laying them on a pallet in designated patterns (E9.17.2)

SELECTED TOOLS AND MATERIALS

Pallets
Sod cutter
Equipment operating manual

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Turf Management. Ohio Curriculum Materials.
Turfgrass Maintenance Workers. V-TECS. Performance Objectives 45, 69-71.

DUTY AREA

10. STORING AND SHIPPING PLANTS AND SUPPLIES

TASKS/COMPETENCIES

10.1 Check received merchandise against invoice listing

10.2 Store received supplies

10.3 Bunch, pack, and/or wrap plants for shipment

10.4 Assemble shipping boxes

10.5 Package orders for shipment

10.6 Complete invoices and shipping labels

10.7 Load customer's vehicle

10.8 Overwinter containerized plants

DUTY AREA

10. STORING AND SHIPPING PLANTS AND SUPPLIES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

10.1 Check received merchandise against invoice listing

COURSE

Horticulture IV (8036)

10.1

PERFORMANCE OBJECTIVE

P10.1 Given a shipment of merchandise and an invoice, check received merchandise against invoice listing. All items not received or damaged must be noted on invoice.

SELECTED ENABLING OBJECTIVES

E10.1.1 Explain the importance of handling flowers carefully.

E10.1.2 Arrange received merchandise in an orderly group to be checked.

E10.1.3 Begin with the first item in the invoice and check all items to determine if all merchandise was delivered.

E10.1.4 Report all items not received.

F10.1.5 Check all items for damage.

E10.1.6 Report all damaged items.

E10.1.7 Sign invoice.

CRITERION-REFERENCED MEASURE

C10.1 Merchandise checked against invoice listing, with all damaged items and items not received noted on invoice.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate how to interpret an invoice listing (E10.1.2-E10.1.7).
2. Demonstrate procedure for checking merchandise against invoice listing (E10.1.2-E10.1.7).
3. Have students check received merchandise against invoice listing (E10.1.1-E10.1.7).
4. Take a field trip to a commercial nursery to observe storing and shipping plants and supplies (E10.1.1-E10.1.7).

SELECTED TOOLS AND MATERIALS

Merchandise shipment
Invoices

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, pp. 529-531. Boodley.
Nursery Production. V-TECS. Performance Objective 58.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 58.

Application

DUTY AREA

10. STORING AND SHIPPING PLANTS AND SUPPLIES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

10.2 Store received supplies

COURSE

Horticulture IV (8036)

10.2

PERFORMANCE OBJECTIVE

P10.2 Given a shipment of supplies, instructions for storage, and an area where supplies are to be stored, store received supplies. Supplies are to be stored neatly and in the assigned location, and packing materials are to be disposed of properly.

SELECTED ENABLING OBJECTIVES

E10.2.1 Outline correct procedure for storage of pesticides and other horticultural chemicals.

E10.2.2 Identify items to be stored and compare with packing list or invoice.

E10.2.3 Determine the area to be used for storing supplies.

E10.2.4 Label and date supplies when appropriate.

E10.2.5 Dispose of packing materials.

CRITERION-REFERENCED MEASURE

C10.2 Received supplies stored neatly and in assigned location, and packing materials disposed of properly.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Explain supply storage system to students (E10.2.1-E10.2.5).
2. Outline procedures for receiving and storing supplies (E10.2.1-E10.2.5).
3. Review safety rules for handling and storing pesticides or other chemicals (E10.2.1).
4. Review checking merchandise against inventory (E10.2.2).
5. Have students store supplies correctly (E10.2.1-E10.2.5).

SELECTED TOOLS AND MATERIALS

Storage areas
Storage plan or instructions
Supplies to store

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, pp. 519-522, 529-531. Boodley.
Nursery Operation. V-TECS. Performance Objective 64.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 14.

DUTY AREA

10. STORING AND SHIPPING PLANTS AND SUPPLIES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

10.3 Bunch, pack, and wrap plants for shipment

COURSE

Horticulture IV (8036)

10.3

PERFORMANCE OBJECTIVE

P10.3 Given a variety of plants to be shipped and the necessary equipment and supplies, bunch, pack, and wrap the plants and shrubs for shipment. All plants or bunches must be labeled and dated, the large ends of the bunches must alternate with the small ends to pack bundles evenly, and all plants must be wrapped and packed to prevent damage and maintain moisture around roots. All items on instructor's checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E10.3.1 Identify and inventory plants to be bunched, packed, or wrapped.

E10.3.2 Determine number of plants per bundle.

E10.3.3 Place plants of same size in bundles.

E10.3.4 Place moist peat moss, saw dust, or other material around roots of plants to be wrapped.

E10.3.5 Place bundles in alternating layers in cartons or crates.

E10.3.6 Bunch liners of shrubs, according to size.

E10.3.7 Place bunches in cartons or crates, according to size.

E10.3.8 Secure bundles, wrapped plants, cartons, crates, and liners.

E10.3.9 Label and date all plants.

CRITERION-REFERENCED MEASURE

C10.3 Plants bunched, packed, and wrapped and labeled and dated. Bundles packed evenly with large ends alternating with small ends. Plants packed and wrapped to prevent damage and to maintain moisture around roots. All items on instructor's checklist rated acceptable.

INSTRUCTOR'S CHECKLIST 10.3

DUTY: STORING AND SHIPPING PLANTS AND SUPPLIES

TASK: Bunch, pack, and/or wrap plants for shipment

ACTIVITY: Bunch, pack, and/or wrap plants and shrubs for shipment

ITEM	RATING*	
	Acceptable	Unacceptable
The student:		
1. Reviewed shipping instructions before proceeding to package the order.		
2. Used the appropriate size box to package the order.		
3. Wrapped plants in accordance with the requirements for the kinds and quantities of flowers being shipped.		
4. Used newspaper, excelsior, or other filler judiciously in packaging the order and as required for assuring the arrival of the shipment in good condition.		
5. Included invoice and shipping label with the order.		

***All items must receive acceptable rating.**

Source: Floriculture Workers. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with plants to be bunched, packed, or wrapped (E10.3.1).
2. Demonstrate how to bunch, pack, and wrap plants for shipment (E10.3.1-E10.3.9).
3. Have students practice bunching, packing, and wrapping plants for shipment (E10.3.1-E10.3.9).

SELECTED TOOLS AND MATERIALS

Cartons
Crates
Labels
Packing material
Peat moss
Plants to be shipped
Sawdust
Wire or rope
Wrapping paper
Handout: Instructor's checklist

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, pp. 530-531. Boodley.
Floriculture Worker. V-TECS. Performance Objective 83.
An Introduction to Floriculture. Task Sheets. Ohio Curriculum Materials.
Nursery Production. V-TECS. Performance Objectives 52, 53, 54, 55, and 56.

—— Application ——

DUTY AREA

10. STORING AND SHIPPING PLANTS AND SUPPLIES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

10.4 Assemble shipping boxes

COURSE

Horticulture IV (8036)

10.4

PERFORMANCE OBJECTIVE

P10.4 Given a variety of unassembled shipping boxes in assorted sizes and styles and the necessary supplies, equipment, and directions, assemble shipping boxes in accordance with manufacturer's or instructor's directions.

SELECTED ENABLING OBJECTIVES

E10.4.1 Arrange all necessary equipment and materials.

E10.4.2 Unfold, staple, and tape each carton.

E10.4.3 Check each carton to ensure proper assembly.

E10.4.4 Stack cartons in proper storage area.

E10.4.5 Return all unused materials to storage.

CRITERION-REFERENCED MEASURE

C10.4 Shipping boxes assembled in accordance with manufacturer's or instructor's directions.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate how to assemble shipping boxes (E10.4.1-E10.4.5).
2. Have students assemble shipping boxes (E10.4.1-E10.4.5).
3. Review with students manufacturer's directions for box assembly (E10.4.2).

SELECTED TOOLS AND MATERIALS

Cartons to be assembled
Box stapler
Box tape
Manufacturer's directions

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse. See individual sections on different plants.
Floriculture Worker. V-TECS. Performance Objective 84.
Floriculture Worker, p. 92. V-TECS.
An Introduction to Floriculture. Task Sheets. Ohio Curriculum Materials.

DUTY AREA

10. STORING AND SHIPPING PLANTS AND SUPPLIES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

10.5 Package orders for shipment

COURSE

Horticulture IV (8036)

10.5

PERFORMANCE OBJECTIVE

P10.5 Given the necessary boxes, wrapping materials, potted plants and/or cut flowers to fill an order, package the plants and flowers for shipment. All items on the instructor's checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E10.5.1 Read the packaging and shipping procedures for the particular order being filled.

E10.5.2 Prepare for packing plants in accordance with the requirements for safe shipment for the kind of plants being shipped:

a. Make certain plants are in good condition when packed.
b. Pack flowers firmly to prevent movement in shipping.
c. Provide insulation for temperature control and to prevent the plants from becoming too dry. Use waxed paper, boxes, or plastic wrapper.

E10.5.3 Include the necessary invoices and shipping labels.

E10.5.4 Clean work area.

CRITERION-REFERENCED MEASURE

C10.5 Orders packaged for shipment; all items on instructor's checklist rated acceptable.

INSTRUCTOR CHECKLIST 10.5

DUTY: STORING AND SHIPPING PLANTS AND SUPPLIES

TASK: Package orders for shipment

ACTIVITY: Package plants and flowers for shipment

ITEM	RATING*	
	Acceptable	Unacceptable
The student:		
1. Shipping instructions reviewed before proceeding to package the order.		
2. Appropriate size box used to package the order.		
3. Plants wrapped in accordance with the requirements for the kinds and quantities of flowers being shipped.		
4. Newspaper, excelsior, or other packing filler used judiciously and as required for assuring arrival of shipment in good condition without damages.		
5. Invoice and shipping label included with the order.		

*All items must receive acceptable rating.

Source: Floriculture Worker, V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Outline and demonstrate packaging and shipping procedures for designated orders (E10.5.1-E10.5.4).
2. Have students package orders for shipment (E10.5.1-E10.5.4).

SELECTED TOOLS AND MATERIALS

Boxes or crates
Fillers
Invoices
Plants
Shipping labels
Wrapping supplies
Excelsior
Handout: Instructor's checklist

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, pp. 528-531. Boodley.
Floriculture Worker. V-TECS. Performance Objective 83.
An Introduction to Horticulture. Task Sheets. Ohio Curriculum Materials.
Nursery Production. V-TECS. Performance Objective 61.

DUTY AREA

10. STORING AND SHIPPING PLANTS AND SUPPLIES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

10.6 Complete invoices and shipping labels

COURSE

Horticulture IV (8036)

10.6

PERFORMANCE OBJECTIVE

P10.6 Given three blank invoices and labels for shipping and all necessary instructions and data, complete the invoices and labels. The invoices and labels must be completed without error. Extensions and totals must agree with those made by instructor.

SELECTED ENABLING OBJECTIVES

E10.6.1 Indicate the receiver and buyer on the invoice.

E10.6.2 Check to determine presence of packer's signature.

E10.6.3 Note the method of shipment.

E10.6.4 Indicate quantity shipped and plant description and extend unit price and total.

E10.6.5 Add sales tax, if applicable.

E10.6.6 Verify shipment against quantity ordered.

E10.6.7 Total prices.

E10.6.8 Complete shipping labels indicating receiver, sender, purchase order number, and invoice number.

CRITERION-REFERENCED MEASURE

C10.6 Invoices and labels completed correctly; extensions and totals agree with instructor's totals.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Devise transparencies or provide students with sample invoices and shipping labels and review with class (E10.6.1-E10.6.8).
2. Demonstrate how to make out invoices and shipping labels (E10.6.1-E10.6.8).
3. Have students practice making out invoices and shipping labels (E10.6.1-E10.6.8).
4. Review taking percentages with particular emphasis on sales tax figures (E10.6.5).

SELECTED TOOLS AND MATERIALS

Invoices
Shipping labels

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 82.
An Introduction to Horticulture. Ohio Curriculum Materials.

Application

DUTY AREA

10. STORING AND SHIPPING PLANTS AND SUPPLIES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

10.7 Load customer's vehicle

COURSE

Horticulture IV (8036)

10.7

PERFORMANCE OBJECTIVE

P10.7 Given a selection of plants and related materials, a customer's vehicle, and the necessary tools and equipment, load a customer's vehicle. All items on an instructor-prepared checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E10.7.1 List and describe ways to help maintain effective customer relations for a variety of service situations.

E10.7.2 Identify proper way(s) to handle designated plants.

E10.7.3 Select products to be shipped.

E10.7.4 Group products on vehicle.

E10.7.5 Allow for air circulation.

CRITERION-REFERENCED MEASURE

C10.7 Customer vehicle loaded in accordance with instructor-prepared checklist; all items rated acceptable.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students give examples of ways to provide effective customer service (E10.7.1).
2. Explain and demonstrate procedure for loading customer's vehicles (E10.7.1-E10.7.5).
3. Have student practice loading customer's vehicle (E10.7.2-E10.7.5).

SELECTED TOOLS AND MATERIALS

Handout: Instructor-prepared checklist
Merchandise
Loading equipment as needed
Vehicle

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Nursery Production. V-TECS. Performance Objective 60.

Application

DUTY AREA

10. STORING AND SHIPPING PLANTS AND SUPPLIES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

10.8 Overwinter containerized plants

COURSE

Horticulture IV (8036)

10.8

PERFORMANCE OBJECTIVE

P10.8 Given container plants, and necessary equipment and supplies, overwinter plants. Care must prevent freeze damage to the foliage and roots.

SELECTED ENABLING OBJECTIVES

E10.8.1 Select plants to be overwintered.

E10.8.2 Arrange plants in an area that can be protected.

E10.8.3 Place plants close together in the protected area.

E10.8.4 Place a layer of mulch around the outer edge of the block of plants if they are overwintered out-of-doors.

E10.8.5 Water plants regularly to keep soil moist.

CRITERION-REFERENCED MEASURE

C10.8 Plants overwintered so that foliage and roots prevented from freeze damage.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss various methods used to overwinter containerized plants (E10.8.1-E10.8.5).

2. Have students do the following (E10.8.1-E10.8.5):
   a. Use straw bales around container blocks.
   b. Use snowfence and/or plastic as windbreak around shadehouse.
   c. Construct a small plastic, pipe-frame quonset house.

SELECTED TOOLS AND MATERIALS

Container plants
Mulch
Plastic
Snowfence
Storage area
Straw bales

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Nursery Production. V-TECS. Performance Objective 57.
Ornamental Horticulture, pp. 373-374. McDaniel.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

TASKS/COMPETENCIES

11.1 Make bows

11.2 Dress potted plants

11.3 Wire flowers for arrangements and corsages

11.4 Make nets or fans

11.5 Spray-tint dried and live floral products

11.6 Design corsages

11.7 Design bud vases

11.8 Design artificial flower and foliage arrangements

11.9 Design symmetrically balanced triangular arrangements

11.10 Design right-angle arrangements

11.11 Design vertically shaped arrangements

11.12 Design Hogarth-shaped arrangements

11.13 Design novelty arrangements

11.14 Design oval arrangements

11.15 Design crescent arrangements

11.16 Design wreaths

11.17 Design planters

11.18 Design dish gardens

11.19 Design terraria

11.20 Set up and dismantle church decorations

11.21 Set up and dismantle wedding decorations

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

11.1 Make bows

COURSE

Horticulture IV (8036)

11.1

PERFORMANCE OBJECTIVE

P11.1 Given a corsage, florist wire, ribbon, scissors, and an instructor's model, make a bow for a corsage. The bow must be tied securely. All items on an instructor-prepared checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E11.1.1 Describe a well made bow.

E11.1.2 Assemble tools and supplies.

E11.1.3 Outline procedure for making bows.

CRITERION-REFERENCED MEASURE

C11.1 Bow made and tied securely with all items on an instructor-prepared checklist rated acceptable.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Invite a representative of a local florist shop to present a demonstration on making bows (E11.1.1-E11.1.3).
2. Show filmstrip Basic Floral Techniques and discuss (E11.1.1-E11.1.3).
3. Have students practice making bows (E11.1.1-E11.1.3).

SELECTED TOOLS AND MATERIALS

Florist wire #28 and #30
Scissors
Corsage ribbon #3
Wire cutters
Handout: Instructor-prepared checklist

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Basic Floral Techniques. Vocational Education Productions.

SELECTED REFERENCES

Introductory Horticulture, pp. 68-71. Reiley and Shry.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 33.
Floral Design and Arrangement, pp. 119-121. McDaniel.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

11.2 Dress potted plants

COURSE

Horticulture IV (8036)

11.2

PERFORMANCE OBJECTIVE

P11.2 Given a potted plant, foil, ribbon, and designer's tools, dress a potted plant. The finished dressing should extend at least 2 inches above the rim of the pot and be cupped under the lower growth of foliage; the bow must be symmetrical and attached securely to the pot.

SELECTED ENABLING OBJECTIVES

E11.2.1 Assemble tools and materials.

E11.2.2 Cut the covering material.

E11.2.3 Enclose the potted plant base in the covering.

E11.2.4 Tie a bow, using a ribbon color that will complement the color of the plant and the covering material.

E11.2.5 Tie a piece of ribbon around the pot and its cover.

E11.2.6 Affix the bow to a wooden pick and insert it into the soil at the front of the pot at the high point of the ribbon.

CRITERION-REFERENCED MEASURE

C11.2 Potted plant dressed, with finished dressing extending at least 2 inches above rim of the pot and cupped under the lower growth of foliage; bow symmetrical and attached securely to pot.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate how to dress potted plants (E11.2.1-E11.2.6).
2. Have students practice dressing potted plants (E11.2.1-E11.2.6).

SELECTED TOOLS AND MATERIALS

Designer's tools
Foil
Potted plants
Ribbon
Picks

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Ornamental Horticulture, pp. 258-259. McDaniel.
Retail Flower Shop Operation and Management, p. 103. Pennsylvania State University.
Retail Florist, Teacher's Guide, pp. 83-87. Illinois Office of Education.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 32.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

11.3 Wire flowers for arrangements and corsages

COURSE

Horticulture IV (8036)

11.3

PERFORMANCE OBJECTIVE

P11.3 Given a variety of flowers, instructor's models, and access to floral wire, designer's tools, and materials, wire flowers for arrangements and corsages, using the piercing, straight-wire, hairpin, and hook-wire methods. Each flower must be wired in accordance with instructor-prepared guidelines and must be undamaged.

SELECTED ENABLING OBJECTIVES

E11.3.1 Identify appropriate wiring method for use with designated flowers.

E11.3.2 Outline and demonstrate procedure for wiring flowers, using the piercing, straight-wire, hairpin, and hook-wire methods.

CRITERION-REFERENCED MEASURE

C11.3 Flowers for arrangements and corsages wired, using the piercing, straight-wire, hairpin, and hook-wire methods; flowers undamaged and wired in accordance with instructor-prepared guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate how to wire flowers, using the piercing, straight-wire, hairpin, and hook-wire methods (E11.3.1, E11.3.2).
2. Have students practice wiring flowers, using a variety of methods (E11.3.1, E11.3.2).
3. Show slide set Corsage Construction and discuss (E11.3.1, E11.3.2).

SELECTED TOOLS AND MATERIALS

Florist wire #24 - #32
Floral tape
Cotton
Florist shears/knife
Variety of flowers
Wire cutters
Handout: Instructor-prepared guidelines

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette:	Basic Floral Techniques. Vocational Education Productions.
Slides:	Corsage Construction. Ohio Curriculum Materials.

SELECTED REFERENCES

Floral Design and Arrangement, pp. 112-115. McDaniel.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objectives 36, 37, 38, and 39.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

11.4 Make nets or fans

COURSE

Horticulture IV (8036)

11.4

PERFORMANCE OBJECTIVE

P11.4 Given florist netting, shears, and florist wire, make nets or fans. Nets or fans must be constructed so that mechanics are not visible, and the size must be appropriate for the intended use, as specified by the instructor.

SELECTED ENABLING OBJECTIVES

E11.4.1 Assemble tools and materials.

E11.4.2 Examine sample nets or fans and identify various decorative uses.

E11.4.3 Outline procedure for making nets or fans.

CRITERION-REFERENCED MEASURE

C11.4 Nets and fans made with mechanics not visible and size appropriate for intended use as specified by instructor.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display sample nets and fans (E11.4.2)
2. Demonstrate and have students make nets and fans (E11.4.1-E11.4.3).

SELECTED TOOLS AND MATERIALS

Florist netting
Florist wire
Shears

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floral Design and Arrangement, p. 119. McDaniel.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

11.5 Spray-tint dried and live floral products

COURSE

Horticulture IV (8036)

11.5

PERFORMANCE OBJECTIVE

P11.5 Given an order for a flower arrangement that includes flowers that have to be spray-tinted and access to spray tinting materials, spray-tint dried and live floral products. The finished flowers must be smoothly covered and void of any color build-up.

SELECTED ENABLING OBJECTIVES

E11.5.1 Read the order to determine the colors of tint that will be needed.

E11.5.2 Assemble the flowers and spray-tints.

E11.5.3 Spray-tint in a well ventilated room.

E11.5.4 Feel the material to be tinted to determine that it is relatively dry.

E11.5.5 Apply spray at a distance of approximately 18 inches from the product.

E11.5.6 Spray light coats, allowing each coat to dry before applying the next one.

CRITERION-REFERENCED MEASURE

C11.5 Dried and live floral products spray-tinted smoothly and void of any color build-up.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Give demonstration on how to spray-tint both dried and live floral products (E11.5.1-E11.5.6).
2. Have students practice spray-tinting dried and live floral products (E11.5.1-E11.5.6).
3. Invite an art teacher to speak to class about color shades, tints, and hues (E11.5.1).

SELECTED TOOLS AND MATERIALS

Dried floral products
Live floral products
Spray-tints

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Corsage Construction. Task Sheets. Ohio Curriculum Materials.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 35.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

11.6 Design corsages

COURSE

Horticulture IV (8036)

11.6

PERFORMANCE OBJECTIVE

P11.6 Given an order for a corsage and access to flowers and equipment, design the corsage. The finished corsage must compare with the instructor's model and include the following principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal point.

SELECTED ENABLING OBJECTIVES

E11.6.1 Identify and define principles of floral design.

E11.6.2 Plan the corsage to incorporate the principles of floral design.

E11.6.3 Draw a single-line sketch of the planned corsage.

E11.6.4 Assemble tools, supplies, and flowers at the work area.

E11.6.5 Assemble crescent-shaped and triangle-shaped corsages.

CRITERION-REFERENCED MEASURE

C11.6 Corsage designed; finished product includes the principles of floral design and compares acceptably with instructor's model.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss and illustrate principles of floral design, using illustrations or models of various corsage designs (E11.6.1).
2. Demonstrate how to design and assemble triangle-shaped and crescent-shaped corsages (E11.6.1-E11.6.5).
3. Provide students with roses, carnations, or other flowers suitable for corsages (E11.6.4).
4. Have students practice designing and assembling corsages (E11.6.1-E11.6.5).
5. Have students critique one another's work (E11.6.1-E11.6.5).

SELECTED TOOLS AND MATERIALS

Floral shears/knife
Floral wire/chenille stems
Wire cutters
Tulle
Ribbon
Ribbon scissors
Floral tape
Flowers

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Flowers to Wear. Vocational Education Productions.

SELECTED REFERENCES

Floral Design and Arrangement. McDaniel.
Floral Design Set Pieces. Task Sheets. Ohio Curriculum Materials.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 18.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

11.7 Design bud vases

COURSE

Horticulture IV (8036)

11.7

PERFORMANCE OBJECTIVE

P11.7 Given an order for a bud vase arrangement and access to flowers and equipment, design the bud vase. The finished bud vase must compare with the instructor's model and include the following principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal point.

SELECTED ENABLING OBJECTIVES

E11.7.1 Relate principles of floral design to bud vase arrangements.

E11.7.2 Assemble tools and supplies.

E11.7.3 Determine number of flowers to be included in bud vase arrangements.

E11.7.4 Plan the bud vase arrangement to incorporate principles of floral design.

E11.7.5 Draw a single-line sketch of the arrangement.

E11.7.6 Assemble single, two-flower, and three-flower bud vase arrangements.

CRITERION-REFERENCED MEASURE

C11.7 Bud vase designed; finished product includes the principles of floral design and compares acceptably with the instructor's model.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review principles of floral design, using illustrations or models of various kinds of bud arrangements (E11.7.1).
2. Provide students with tools, supplies, and job order specifications (E11.7.2).
3. Demonstrate how to design and assemble various bud vase arrangements (E11.7.2-E11.7.6).
4. Have students practice designing and assembling bud vase arrangements (E11.7.2-E11.7.6).
5. Have students critique one another's work (E11.7.1-E11.7.6).

SELECTED TOOLS AND MATERIALS

Containers
Carnations, roses, or other flowers
Floral knife or shears
Foliage
Ribbon for bow (optional)

SELECTED AUDIOVISUAL MATERIALS

Slides: Flower Arranging. Ohio Curriculum Materials.

SELECTED REFERENCES

Designing with Flowers and Decorative Materials. Pennsylvania State University.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 40.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

11.8 Design artificial flower and foliage arrangements

COURSE

Horticulture IV (8036)

11.8

PERFORMANCE OBJECTIVE

P11.8 Given an order for a dry or silk flower arrangement and access to flowers and equipment, design the arrangement. The finished arrangement must compare with the instructor's model and include the following principles of design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal point.

SELECTED ENABLING OBJECTIVES

E11.8.1 Examine and describe various types of artificial flower and foliage arrangements.

E11.8.2 Select the desired geometric form (shape).

E11.8.3 Sketch a line drawing of the arrangement.

E11.8.4 Plan the arrangement to include the principles of floral design.

E11.8.5 Select and assemble tools and materials.

E11.8.6 Select an appropriate container and prepare it to receive the flowers and foliage.

E11.8.7 Cut the stems of the flowers to desired lengths with wire cutters or floral shears, taking care to plan lengths carefully to obtain the desired shape.

E11.8.8 Wire and tape weak stems and pick, if necessary.

CRITERION-REFERENCED MEASURE

C11.8 Artificial flower and foliage arrangements designed; finished product includes the principles of floral design and compares acceptably with the instructor's model.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display and discuss samples of effective silk, plastic, and dried artificial flower arrangements (E11.8.1).
2. Demonstrate how to design and assemble various types of artificial flower and foliage arrangements (E11.8.2-E11.8.8).
3. Have students practice designing and arranging dried, plastic, silk flower, and foliage arrangements (E11.8.2-E11.8.8).
4. Have students critique one another's work (E11.8.1-E11.8.8).

SELECTED TOOLS AND MATERIALS

Clay, wire, or tape for anchoring foam
Containers
Flowers and foliage
Foam block
Foil or spray paint for wrapping or spraying foam holder (optional)
Sand pebbles, or other material for weighing the arrangement
Wire cutters
Wire
Floral tape
Picks

SELECTED AUDIOVISUAL MATERIALS

Slides: Flower Arranging. Ohio Curriculum Materials.

SELECTED REFERENCES

Basic Floral Design. Task Sheets. Ohio Curriculum Materials.
Floral Design and Arrangement, pp. 149-177. McDaniel.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 15.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

11.9 Design symmetrically balanced triangular arrangements

COURSE

Horticulture IV (8036)

11.9

PERFORMANCE OBJECTIVE

P11.9 Given an order and access to flowers and equipment, design a symmetrically balanced triangular arrangement. The finished arrangement must compare with the instructor's model and include the following principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal point.

SELECTED ENABLING OBJECTIVES

E11.9.1 Plan the arrangement to incorporate the principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal area.

E11.9.2 Draw a single-line sketch of the arrangement.

E11.9.3 Assemble flowers and foliage.

E11.9.4 Assemble tools and supplies.

E11.9.5 Prepare the container to receive the flowers and foliage.

E11.9.6 Construct a symmetrically balanced triangular arrangement, using a single-line sketch as a guide.

CRITERION-REFERENCED MEASURE

C11.9 Symmetrically balanced triangular arrangement designed; finished product includes the principles of floral design and compares acceptably with the instructor's model.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display models or illustrations of symetrically balanced triangular arrangements. Discuss in terms of principles of floral design (E11.9.1).
2. Demonstrate how to plan and assemble symetrically balanced triangular arrangements (E11.9.2-E11.9.6).
3. Have students practice designing and assembling arrangements (E11.9.2-E11.9.6).
4. Have students critique one another's work (E11.9.1-E11.9.6).

SELECTED TOOLS AND MATERIALS

Absorbent floral foam for cut flower arrangements
Containers
Dry floral foam for dried arrangements
Floral tape (optional)
Floral knife and/or shears
Floral wire
Styrofoam for artificial arrangements
Wood or steel picks for dried and artificial materials

SELECTED AUDIOVISUAL MATERIALS

Slides: Flower Arranging. Ohio Curriculum Materials.

SELECTED REFERENCES

Floral Design and Arrangement, pp. 89-97. McDaniel.
Floral Design Set Pieces. Task Sheets. Ohio Curriculum Materials.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 28.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

11.10 Design right-angle arrangements

COURSE

Horticulture IV (8036)

11.10

PERFORMANCE OBJECTIVE

P11.10 Given an order and access to flowers and equipment, design a right-angle arrangement. The finished arrangement must compare with the instructor's model and include the following principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal point.

SELECTED ENABLING OBJECTIVES

E11.10.1 Define: line flower, mass flower, form flower, filler, foliage, balance, proportion, rhythm, and harmony.

E11.10.2 Outline procedure for constructing a right-angle flower arrangement.

E11.10.3 Select harmonious line flowers, mass flowers, and filler flowers for a right-angle arrangement.

CRITERION-REFERENCED MEASURE

C11.10 Right-angle arrangement designed; finished product includes the principles of floral design and compares acceptably with the instructor's model.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss key terms and concepts related to floral arrangement design. Display sample right-angle arrangements and explain in terms of design and construction elements (E11.10.1, E11.10.2).

2. Demonstrate how to plan and assemble a right-angle arrangement (E11.10.2).

3. Have students practice designing and assembling right-angle arrangements (E11.10.3).

4. Have students critique one another's work (E11.10.2, E11.10.3).

SELECTED TOOLS AND MATERIALS

Absorbent floral foam for cut flower arrangements
Container for arrangement
Dry floral foam for dried arrangements
Floral tape (optional)
Floral knife and/or shears
Floral wire
Styrofoam for artificial arrangements
Wood or steel picks for dried and artificial materials

SELECTED AUDIOVISUAL MATERIALS

Slides: Flower Arranging. Ohio Curriculum Materials.

SELECTED REFERENCES

Floral Design and Arrangement, pp. 95-98. McDaniel.
Floral Design Set Pieces. Task Sheets. Ohio Curriculum Materials.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 30.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

11.11 Design vertically shaped arrangements

COURSE

Horticulture (8036)

11.11

PERFORMANCE OBJECTIVE

P11.11 Given an order and access to flowers and equipment, design a vertically shaped arrangement. The finished arrangement must compare with the instructor's model and include the following principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal point.

SELECTED ENABLING OBJECTIVES

E11.11.1 Plan the arrangement to incorporate the principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal area.

E11.11.2 Draw a single-line sketch of the arrangement.

E11.11.3 Assemble flowers and foliage.

E11.11.4 Assemble tools and supplies.

E11.11.5 Prepare the container to receive the flowers.

E11.11.6 Construct the vertical arrangement, using the single-line sketch as a guide.

CRITERION-REFERENCED MEASURE

C11.11 Vertically shaped arrangement designed; finished product includes principles of floral design and compares acceptably with the instructor's model.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display models or illustrations of vertically shaped arrangements (E11.11.1).
2. Demonstrate how to plan and assemble vertically shaped arrangements (E11.11.1-E11.11.6).
3. Have students practice designing and assembling vertically shaped arrangements (E11.11.1-E11.11.6).
4. Have students critique one another's work (E11.11.1-E11.11.6).

SELECTED TOOLS AND MATERIALS

Absorbent floral foam for cut flower arrangements
Container
Dry foam for dried arrangements
Floral knife and/or shears
Floral tape (optional)
Floral wire
Styrofoam for artificial arrangements
Waterproof tape
Wood or steel picks

SELECTED AUDIOVISUAL MATERIALS

Slides: Flower Arranging. Ohio Curriculum Materials.

SELECTED REFERENCES

Floral Design and Arrangement, pp. 100-102. McDaniel.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 31.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

11.12 Design Hogarth-shaped arrangements

COURSE

Horticulture IV (8036)

11.12

PERFORMANCE OBJECTIVE

P11.12 Given an order and access to flowers and equipment, design a Hogarth-shaped arrangement. The finished arrangement must compare with the instructor's model and include the following principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal point.

SELECTED ENABLING OBJECTIVES

E11.12.1 Plan the arrangement to exhibit the principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal area.

E11.12.2 Draw a single-line sketch of the arrangement.

E11.12.3 Assemble flowers and foliage.

E11.12.4 Assemble tools and suppplies.

E11.12.5 Prepare the container to receive the flowers.

E11.12.6 Construct the Hogarth-shaped arrangement, using the single-line sketch as a guide.

CRITERION-REFERENCED MEASURE

C11.12 Hogarth-shaped arrangement designed; finished product includes principles of floral design and compares acceptably with the instructor's model.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display models or illustrations of Hogarth-shaped arrangements (E11.12.1).
2. Demonstrate how to plan and assemble Hogarth-shaped arrangements (E11.12.1-E11.12.6).
3. Have students practice designing and assembling Hogarth-shaped arrangements (E11.12.1-E11.12.6).
4. Have students critique one another's work (E11.12.1-E11.12.6).

SELECTED TOOLS AND MATERIALS

Absorbent floral foam for cut flower arrangements
Container for arrangement
Dry floral foam or styrofoam for artificial arrangements
Floral shears or knife
Floral tape (optional)
Floral wire
Waterproof tape
Wire cutters for artificial materials
Wood or steel picks for artificial materials

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floral Design and Arrangement, pp. 106-107. McDaniel.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 24.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

11.13 Design novelty arrangements

COURSE

Horticulture IV (8036)

11.13

PERFORMANCE OBJECTIVE

P11.13 Given an order and access to flowers and equipment, design a novelty arrangement. The finished arrangement must compare with the instructor's model and include the following principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal point.

SELECTED ENABLING OBJECTIVES

E11.13.1 Plan the arrangement to incorporate the principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal area.

E11.13.2 Draw a single-line sketch arrangement.

E11.13.3 Assemble the flowers and foliage.

E11.13.4 Assemble tools and materials.

E11.13.5 Cut foam to fit container.

E11.13.6 Put foam into container and anchor it.

E11.13.7 Cut flower stems.

E11.13.8 Wire and tape cut flowers' stems (optional).

E11.13.9 Pick artificial materials.

CRITERION-REFERENCED MEASURE

C11.13 Novelty arrangement designed; finished product includes principles of floral design and compares acceptably with the instructor's model.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display models or illustrations of novelty arrangements (E11.13.1).
2. Demonstrate how to plan and assemble novelty arrangements (E11.13.1-E11.13.9).
3. Have students practice designing and assembling novelty arrangements (E11.13.1-E11.13.9).
4. Have students critique one another's work (E11.13.1-E11.13.9).

SELECTED TOOLS AND MATERIALS

Absorbent floral foam for cut flower arrangements
Container for arrangement
Dry floral foam or styrofoam for artificial arrangements
Floral shears or knife
Floral tape (optional)
Floral wire
Waterproof tape
Wire cutters for artificial materials
Wood or steel picks for artificial materials
Wire service sample books

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 25.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

11.14 Design oval arrangements

COURSE

Horticulture IV (8036)

11.14

PERFORMANCE OBJECTIVE

P11.14 Given an order and access to flowers and equipment, design an oval arrangement. The finished arrangement must compare with the instructor's model and include the following principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal point.

SELECTED ENABLING OBJECTIVES

E11.14.1 Plan the arrangement to incorporate the principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal area.

E11.14.2 Draw a single-line sketch of the arrangement.

E11.14.3 Assemble flowers and foliage.

E11.14.4 Assemble tools and supplies.

E11.14.5 Prepare the container to receive the flowers.

E11.14.6 Construct the oval arrangement, using the single-line sketch as a guide.

CRITERION-REFERENCED MEASURE

C11.14 Oval arrangement designed; finished product includes principles of floral design and compares acceptably with instructor's model.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display models or samples of oval arrangements. Discuss in terms of principles of floral design (E11.14.1).
2. Demonstrate how to plan and assemble oval arrangements (E11.14.1-E11.14.6).
3. Have students practice planning and assembling oval arrangements (E11.14.1-E11.14.6).
4. Have students critique one another's work (E11.14.1-E11.14.6).

SELECTED TOOLS AND MATERIALS

Absorbent floral foam for cut flower arrangement
Container
Dry floral foam for dried flowers
Floral knife and/or shears
Floral tape (optional)
Floral wire
Styrofoam for artificial arrangements
Waterproof tape
Wire cutters for artificial materials
Wood or steel picks for dried and artificial materials

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floral Design and Arrangement, pp. 86-88. McDaniel.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 26.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

11.15 Design crescent arrangements

COURSE

Horticulture IV (8036)

11.15

PERFORMANCE OBJECTIVE

P11.15 Given an order, cut or artificial flowers (dried, silk, plastic), and equipment, design a crescent arrangement. The finished arrangement must compare with the instructor's model and include the following principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal point.

SELECTED ENABLING OBJECTIVES

E11.15.1 Plan the arrangement to incorporate the principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal area.

E11.15.2 Draw a single-line sketch of the arrangement.

E11.15.3 Assemble flowers and foliage: cut or artificial (silk, dried, plastic).

E11.15.4 Assemble tools and supplies.

E11.15.5 Prepare a container to receive the flowers.

E11.15.6 Construct a crescent arrangement, using the single-line sketch as a guide.

CRITERION-REFERENCED MEASURE

C11.15 Crescent arrangement designed; finished product includes principles of floral design and compares acceptably with instructor's model.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display models or illustrations of crescent arrangements. Discuss in terms of principles of floral design (E11.15.1).
2. Demonstrate how to plan and assemble a crescent arrangement (E11.15.1-E11.15.6).
3. Have students practice planning and assembling crescent arrangements (E11.15.1-E11.15.6).
4. Have students critique one another's work (E11.15.1-E11.15.6).

SELECTED TOOLS AND MATERIALS

Absorbent floral foam for cut flower arrangement
Container
Dry floral foam for dried flowers
Floral knife and/or shears
Floral tape (optional)
Floral wire
Styrofoam for artificial arrangements
Waterproof tape
Wire cutters for artificial materials
Wood or steel picks for dried and artificial materials

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floral Design and Arrangement, pp. 103-107. McDaniel.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 17.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

11.16 Design wreaths

COURSE

Horticulture IV (8036)

11.16

PERFORMANCE OBJECTIVE

P11.16 Given an order, access to flowers, greens, or appropriate materials, and equipment, design a wreath. The finished wreath must compare with in the instructor's model and include the following principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal point.

SELECTED ENABLING OBJECTIVES

E11.16.1 Plan the arrangement to incorporate the principles of floral design: shape, scale and proportion, harmony, rhythm, unity, repetition, and focal area.

E11.16.2 Assemble the flowers, foliage, greens, and other materials.

E11.16.3 Assemble tools and supplies.

E11.16.4 Wrap the wreath foam with ribbon as if wrapping a bandage. Insert a greening pin through the wreath to hold the ribbon in place. (Wrap only the portion of the wreath that will be exposed).

E11.16.5 Push a greening pin horizontally through the satin ribbon at the end of the wrapping to hold it in place.

E11.16.6 Design a cluster.

E11.16.7 Tie a bow.

E11.16.8 Fasten the bow to a wooden pick and insert pick in wreath.

CRITERION-REFERENCED MEASURE

C11.16 Wreath designed; finished product includes principles of floral design and compares acceptably with instructor's model.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display illustrations or models of funeral, Christmas, and other wreaths. Discuss in terms of principles of floral design and materials used (E11.16.1, E11.16.2).
2. Demonstrate how to plan and assemble wreaths (E11.16.1-E11.16.8).
3. Show slides and discuss (E11.16.1).
4. Have students design swags or similar wreath-type displays (E11.16.1-E11.16.8).
5. Have students collect and prepare materials for use in natural-wreath designs (E11.16.1-E11.16.8).

SELECTED TOOLS AND MATERIALS

Easel
Wreath frame
Floral shears/knife
Letters for ribbon (optional)
Ribbon
Water picks
Wooden picks

SELECTED AUDIOVISUAL MATERIALS

Slides: Floral Tributes. Ohio Curriculum Materials.

SELECTED REFERENCES

Floral Design and Arrangement, pp. 182-185, 244-245. McDaniel.
Introductory Horticulture, pp. 57-63. Reiley and Shry.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 23.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

11.17 Design planters

COURSE

Horticulture IV (8036)

11.17

PERFORMANCE OBJECTIVE

P11.17 Given an order for a table-size planter and access to plants and equipment, design the planter. The finished planter must compare with the instructor's model and include the following principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal point.

SELECTED ENABLING OBJECTIVES

E11.17.1 Plan the planter to incorporate the principles of design.

E11.17.2 Perform the following sequenced job skills:

a. Draw a single-line sketch of the planter.
b. Assemble the plants.
c. Assemble the tools and materials.
d. Clean the planter container.
e. Fill the container with a drainage material.
f. Remove the plants from growing containers.
g. Trim the roots of plants only if necessary.
h. Place the roots of plants on the drainage layer.
i. Pour potting soil over the roots of the plants covering them completely.
j. Press the soil over the roots.
k. Put potting soil into remaining spaces in the planter container.
l. Water the planter.
m. Clean the leaves of the plants.
n. Clean the outside surface of the container.
o. Attach a care card to the planter.

CRITERION-REFERENCED MEASURE

C11.17 Planter designed; finished product includes principles of floral design and compares acceptably with instructor's model.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students locate illustrations of planters and discuss their uses (11.17.1).
2. Demonstrate how to design and assemble a planter (E11.17.1, E11.17.2).
3. Have students practice designing and assembling planters (E11.17.1, E11.17.2).

SELECTED TOOLS AND MATERIALS

Blunt end tools
Care cards
Containers
Drainage materials
Plants
Potting soil
Shears

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 27.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

11.18 Design dish gardens

COURSE

Horticulture IV (8036)

11.18

PERFORMANCE OBJECTIVE

P11.18 Given an order and access to plants and equipment, design a dish garden. The finished dish garden must compare with the instructor's model and include the following principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal point.

SELECTED ENABLING OBJECTIVES

E11.18.1 Plan the dish garden to incorporate the principles of design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal area.

E11.18.2 Demonstrate the following sequenced job skills:

a. Draw a single-line sketch of the dish garden.
b. Assemble plants.
c. Assemble tools and materials.
d. Wash and clean container.
e. Place ½ inch of gravel in the bottom of the container.
f. Put soil into container, filling approximately ½ of the container.
g. Remove plants from growing containers.
h. Trim roots of plants only if they are too large.
i. Put roots of plants on the layer of soil.
j. Cover roots with soil.
k. Press soil around roots.
l. Cover surface of soil with decorative materials such as pebbles or moss (optional).
m. Clean leaves of plants.
n. Attach care card.

CRITERION-REFERENCED MEASURE

C11.18 Dish garden designed; finish product includes principles of floral design and compares acceptably with instructor's model.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display illustrations or models of dish gardens. Discuss in terms of principles of floral design (E11.18.1).
2. Demonstrate how to plan and assemble a dish garden (E11.18.2).
3. Have students practice designing and assembling dish gardens (E11.18.2).
4. Have students critique one another's work (E11.18.1, E11.18.2).

SELECTED TOOLS AND MATERIALS

Blunt end tools
Care cards
Containers
Gravel
Pebbles or moss
Plants
Potting soil
Shears

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Ornamental Horticulture, pp. 201-208. McDaniel.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 19.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

11.19 Design terraria

COURSE

Horticulture IV (8036)

11.19

PERFORMANCE OBJECTIVE

P11.19 Given an order for a terrarium and access to plants and equipment, design the terrarium. The finished terrarium must compare with the instructor's model and include the following principles of floral design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal point.

SELECTED ENABLING OBJECTIVES

E11.19.1 Plan the terrarium to incorporate the principles of design: shape, scale and proportion, harmony, balance, rhythm, unity, repetition, and focal area.

E11.19.2 Plan the terrarium to simulate a natural environment.

E11.19.3 Assemble plants.

E11.19.4 Assemble tools and supplies.

E11.19.5 Assemble terrarium.

CRITERION-REFERENCED MEASURE

C11.19 Terrarium designed; finished product includes principles of floral design and compares acceptably with instructor's model.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display illustrations or models of terraria. Discuss in terms of principles of floral design and list characteristics of effective terrarium designs (E11.19.1).
2. Demonstrate how to plan and assemble a terrarium (E11.19.1-E11.19.5).
3. Have students practice planning and assembling terraria (E11.19.1-E11.19.5).
4. Show filmstrip and discuss (E11.19.1-E11.19.5).

SELECTED TOOLS AND MATERIALS

Charcoal
Blunt end tool for contouring soil
Gravel or sand
Mister
Terrarium container
Terrarium soil mix
Tongs for containers with narrow openings

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Terrariums and How to Make Them. Vocational Education Productions.
Slides/Cassette: Planting a Terrarium. Vocational Agricultural Services.

SELECTED REFERENCES

Ornamental Horticulture, pp. 188-201. McDaniel.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 29.

DUTY AREA

11. DESIGN FLORAL AND PLANT ARRANGEMENTS

TASK/COMPETENCY

11.20 Set up and dismantle church decorations

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

11.20

PERFORMANCE OBJECTIVE

P11.20 Given a plan for decorating a church and access to tools and materials, set up and dismantle the decorations. The decorations must be set up as specified by plans provided by the instructor and must be removed without leaving any debris or damage to furniture and fixtures.

SELECTED ENABLING OBJECTIVES

E11.20.1 Read the plans.

E11.20.2 Assemble the tools, props, floral decorations, and supplies.

E11.20.3 Load the delivery vehicle.

E11.20.4 Telephone to confirm arrangements.

E11.20.5 Meet with church personnel before beginning to decorate.

E11.20.6 Put flower arrangements, candelabras, or props at locations specified by the plan.

E11.20.7 Clean up debris.

E11.20.8 Carry tools to delivery vehicle.

E11.20.9 Dismantle decorations, if required.

E11.20.10 Remove props and decorations. Avoid damage to church fixtures.

E11.20.11 Carry props, decorations, tools, and materials to delivery vehicle.

E11.20.12 Clean up and dispose of debris.

CRITERION-REFERENCED MEASURE

C11.20 Decorations set up and dismantled in accordance with plans provided by instructor, and with no debris or damage to furniture or fixtures.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display illustrations of various types of church decorations (E11.20.1-E11.20.12).
2. Demonstrate and discuss procedures for setting up church decorations (E11.20.1-E11.20.12).
3. Contact local churches to arrange for student practice in setting up various types of church decorations (E11.20.1-E11.20.12).

SELECTED TOOLS AND MATERIALS

Easels
Frames
Shears
Ribbon
Water picks
Wooden picks
Handout: Instructor's plans

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 34.

DUTY AREA

11. DESIGNING FLORAL AND PLANT ARRANGEMENTS

TASK / COMPETENCY

11.21 Set up and dismantle wedding decorations

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

11.21

PERFORMANCE OBJECTIVE

P11.21 Given a plan for decorating a building for a wedding and access to tools and materials, set up and dismantle the decorations. The decorations must be set up as specified by the plan and must be removed without leaving any debris or damage to furniture and fixtures.

SELECTED ENABLING OBJECTIVES

E11.21.1 Read the plans.
E11.21.2 Assemble the tools, props, floral decorations, and supplies.
E11.21.3 Load the delivery vehicle.
E11.21.4 Telephone to confirm arrrangements.
E11.21.5 Meet with wedding personnel before beginning to decorate.
E11.21.6 Put flower arrangements, candelabras, or other props at locations specified.
E11.21.7 Clean up debris.
E11.21.8 Carry tools to delivery vehicle.
E11.21.9 Dismantle decorations after wedding photographs have been completed.
E11.21.10 Remove props and decorations. Avoid damage to building fixtures.
E11.21.11 Carry props, decorations, tools, and materials to delivery vehicle.
E11.21.12 Clean up and dispose of debris.

CRITERION-REFERENCED MEASURE

C11.21 Wedding decorations set up and dismantled in accordance with plans provided and with no debris or damage to furniture or fixtures.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display illustrations of various kinds of wedding decorations (E11.21.1-E11.21.12).
2. Demonstrate and discuss procedures for setting up and dismantling wedding decorations (E11.21.1-E11.21.12).
3. Have students practice setting up and dismantling wedding decorations (E11.21.1-E11.21.12).

SELECTED TOOLS AND MATERIALS

Easels
Frames
Shears
Ribbon
Water picks
Wooden picks
Handout: Instructor's plans

SELECTED AUDIOVISUAL MATERIALS

Slides: Silk Wedding Arrangements. Ohio Curriculum Materials.

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 34.

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

TASKS/COMPETENCIES

12.1 Check in incoming merchandise

12.2 Unpack plant materials and merchandise

12.3 Condition flowers and plants

12.4 Maintain plants

12.5 Attach care cards to plants

12.6 Assemble corsage and cut flower boxes

12.7 Stock shelves, gondolas, and counter tops

12.8 Set up manufacturer's displays

12.9 Design and letter show cards

12.10 Set up counter and table-top displays

12.11 Arrange displays for salesroom cooler

12.12 Build window displays

12.13 Build exterior displays

12.14 Price merchandise

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

12.1 Check in incoming merchandise

COURSE

Horticulture V (8038)

12.1

PERFORMANCE OBJECTIVE

P12.1 Given an incoming order and an invoice, check in the incoming merchandise. A count of the merchandise must appear on the invoice, and all overages or shortages and damage must be noted. Totals and notations must agree with those on instructor's control invoice.

SELECTED ENABLING OBJECTIVES

E12.1.1 Count each item or box of merchandise.

E12.1.2 Read the invoice to determine that the number of items counted is the same number that is printed on the invoice.

E12.1.3 Write the count on the invoice.

E12.1.4 Write any overage or shortage on the invoice.

E12.1.5 Check merchandise for damage.

E12.1.6 Write a description of observed damage on the invoice.

E12.1.7 Give the invoice to appropriate store employee.

CRITERION-REFERENCED MEASURE

C12.1 Merchandise checked in with an accurate count of all merchandise written on the order, and all overages or shortages and all damage noted on the invoice; invoice totals and notations agree with instructor's control invoice.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with samples of various invoices and discuss (E12.1.2-E12.1.6).
2. Demonstrate how to check in incoming merchandise (E12.1.1-E12.1.7).
3. Have students practice checking in incoming merchandise (E12.1.1-E12.1.7).

SELECTED TOOLS AND MATERIALS

Invoices
Merchandise

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, pp. 529-531. Boodley.
The Garden Center Worker. Ohio Curriculum Materials.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 2.

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

12.2 Unpack plant materials and merchandise

COURSE

Horticulture V (8038)

12.2

PERFORMANCE OBJECTIVE

P12.2 Given packed boxes of flowers and supplies, and access to tools, unpack plant materials and merchandise. All of the boxes must be unpacked without damage to the products, and all safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E12.2.1 Select proper tool for opening each box.

E12.2.2 Open cardboard cartons.

E12.2.3 Open wooden boxes.

E12.2.4 Remove packing material and merchandise from boxes.

E12.2.5 Check box number against invoice.

E12.2.6 Inspect merchandise for damage.

E12.2.7 Count merchandise.

E12.2.8 Report any shortages or damage.

E12.2.9 Break down cartons and dispose of debris.

CRITERION-REFERENCED MEASURE

C12.2 Plant materials and merchandise unpacked without damage to products or personal injury.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate how to use band cutter, box cutter, and hammer or wonder bar to open various types of boxes (E12.2.1).
2. Demonstrate how to unpack plant materials and merchandise from cardboard cartons and wooden boxes (E12.2.1-E12.2.9).
3. Have students practice unpacking plant materials and merchandise. Require students to report any damage or shortages and to remove and dispose of all debris (E12.2.1-E12.2.9).

SELECTED TOOLS AND MATERIALS

Band cutter or wire cutters
Box cutter
Hammer
Invoices
Packed merchandise
Wonder bar

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 6.

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

12.3 Condition flowers and plants

COURSE

Horticulture V (8038)

12.3

PERFORMANCE OBJECTIVE

P12.3 Given soft-stemmed, woody-stemmed, and sap-producing flowers, containers, floral preservative, and designer's tools, condition each of the flowers. The soft-stemmed flowers should be cut on a slant and all leaves below water level should be removed; the stems of the woody-stemmed flowers should be shredded; the sap-producing stems should be free of flowing sap and all blooms should be turgid.

SELECTED ENABLING OBJECTIVES

E12.3.1 Assemble tools needed to condition flowers and plants.

E12.3.2 Clean and rinse containers.

E12.3.3 Add warm water and floral preservative (optional) to the containers.

E12.3.4 Clean and sterilize cutting tools.

E12.3.5 Condition soft-stemmed flowers.

E12.3.6 Condition woody-stemmed flowers.

E12.3.7 Condition flowers with stems which secrete a milky-like sap.

CRITERION-REFERENCED MEASURE

C12.3 Soft-stemmed flowers conditioned correctly with cut on a slant and all leaves below water level removed; woody-stemmed flowers conditioned correctly with stem shredded; sap-producing flowers conditioned with stems free of flowing sap and all blooms turgid.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display tools, equipment, and supplies needed to condition flowers (E12.3.1-E12.3.4).
2. Demonstrate how to condition flowers and plants (E12.3.2-E12.3.7).
3. Provide students with a variety of flowers and plants and have them identify the proper conditioning procedure for each (E12.3.5-E12.3.7).

SELECTED TOOLS AND MATERIALS

Alcohol or heat source
Containers
Hammer
Floral knife
Floral preservative
Pruning shears
Sterilization equipment

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floral Design and Arrangement, pp. 60-67. McDaniel.
Floriculture Worker. V-TECS. Performance Objective 69.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 3.

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

12.4 Maintain plants

COURSE

Horticulture V (8038)

12.4

PERFORMANCE OBJECTIVE

P12.4 Given a selection of retail shop plants and the necessary fertilizers, supplies, and equipment, maintain plants by providing water, fertilizer, and other necessary care in accordance with the shop policy and maintenance schedule.

SELECTED ENABLING OBJECTIVES

E12.4.1 Water plants in accordance with maintenance schedule and as directed.

E12.4.2 Apply fertilizers as directed.

E12.4.3 Remove any damaged plant parts.

E12.4.4 Report any damaged or diseased plants.

CRITERION-REFERENCED MEASURE

C12.4 Plants maintained according to shop policy and maintenance schedule.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review fertilization and watering requirements of various plants (E12.4.1, E12.4.2).
2. Provide students with a schedule and directions for maintaining plants for sale (E12.4.1-E12.4.4).
3. Have students rotate responsibility for maintaining plants on display (E12.4.1-E12.4.4).

SELECTED TOOLS AND MATERIALS

Water source
Fertilizer
Floral knife
Handouts: Shop policy
Maintenance schedule

SELECTED AUDIOVISUAL MATERIALS

Transparencies: "Planting and Maintenance," "Water Supply and Fertilizer," Illustrated Horticulture.

SELECTED REFERENCES

The Commercial Greenhouse, pp. 197-215. Boodley.
Ornamental Horticulture, pp. 219-244. McDaniel.

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

12.5 Attach care cards to plants

COURSE

Horticulture V (8038)

12.5

PERFORMANCE OBJECTIVE

P12.5 Given an assortment of plants, plant reference books, and care cards, attach a care card to each plant. Each plant should be tagged with the care card that identifies it, and all cards should be attached so that no damage occurs to the plant.

SELECTED ENABLING OBJECTIVES

E12.5.1 Identify the plant.

E12.5.2 Select the care card that identifies each plant.

E12.5.3 Identify methods to attach care cards that will not damage the plant.

CRITERION-REFERENCED MEASURE

C12.5 Care cards correctly identify each plant, and are attached so that plant is undamaged.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display a variety of nursery or retail shop plants. Provide students with plant reference books to use in identifying plants (E12.5.1).
2. Demonstrate how to attach care cards: attach to a strong stem, or insert into holder, then into soil in front of plant (E12.5.2, E12.5.3).
3. Have students attach care cards to nursery or retail shop plants scheduled for sale (E12.5.1-E12.5.3).

SELECTED TOOLS AND MATERIALS

Plants
Care cards
Plant identification guides

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, pp. 536-537 Boodley.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 1.

Application

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

12.6 Assemble corsage and cut flower boxes

COURSE

Horticulture V (8038)

12.6

PERFORMANCE OBJECTIVE

P12.6 Given necessary supplies, assemble corsage and cut flower boxes. The finished boxes must be sturdy, clean, and all tabs locked in the proper slots.

SELECTED ENABLING OBJECTIVES

E12.6.1 Clean hands.

E12.6.2 Determine how to crease all pre-pressed folds.

E12.6.3 Crease all folds along pre-pressed lines.

E12.6.4 Insert and lock all tabs into slots.

CRITERION-REFERENCED MEASURE

C12.6 Corsage and cut flower boxes assembled correctly so that finished boxes are clean, sturdy, and all tabs locked in proper slots.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate how to assemble corsage and cut flower boxes (E12.6.1-E12.6.4).
2. Have students assemble cut flower and corsage boxes (E12.6.1-E12.6.4).

SELECTED TOOLS AND MATERIALS

Unassembled boxes

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Floriculture, Book I. Sales Service and Promotion. Ohio Curriculum Materials.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 15.

Application

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

12.7 Stock shelves, gondolas, and counter tops

COURSE

Horticulture V (8038)

12.7

PERFORMANCE OBJECTIVE

P12.7 Given merchandise, a price list, and stocking tools and supplies, stock shelves, gondolas, and counter tops with merchandise. The merchandise on the displays must be placed so that all the different varieties of items are visible, merchandise must be within reach of the customers, items must be in related groups, and all merchandise must be priced.

SELECTED ENABLING OBJECTIVES

E12.7.1 Assemble tools and materials.

E12.7.2 Open the cases of merchandise. Avoid damaging the merchandise with the case cutter.

E12.7.3 Read the price list and compute the retail price of the merchandise.

E12.7.4 Clean all merchandise before placing it on shelves.

E12.7.5 Price-mark each item of merchandise before setting it on the shelves.

E12.7.6 Set new merchandise behind older displayed merchandise.

E12.7.7 Set merchandise away from the edge of shelves to avoid having it fall.

E12.7.8 Set similar merchandise together.

E12.7.9 Set merchandise so that all labels will be in a readable position.

CRITERION-REFERENCED MEASURE

C12.7 Shelves, gondolas, and counter tops stocked with different varieties of items visible; merchandise within reach of customers; items in related groups; and all merchandise priced.

SELECTED INSTRUCTIONAL ACTIVITIES

1. List and discuss guidelines for stocking shelves, gondolas, and counter tops with merchandise (E12.7.1-E12.7.9).
2. Demonstrate stocking procedures (E12.7.5-E12.7.9).
3. Have students practice stocking shelves, gondolas, and counter tops with merchandise (E12.7.1-E12.7.9).
4. Arrange for students to visit a commercial retail nursery to view various methods of displaying merchandise (E12.7.3-E12.7.9).

SELECTED TOOLS AND MATERIALS

Case cutter
Dust cloth or feather duster
Price list
Price markers

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

"Display Floor Plan Activity," Retail Florist, Teacher's Guide. Illinois Office of Education.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 14.

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

12.8 Set up manufacturer's display

COURSE

Horticulture V (8038)

12.8

PERFORMANCE OBJECTIVE

P12.8 Given necessary equipment and supplies and access to display space, set up a manufacturer's display. The finished display must compare with the manufacturer's illustration, all items of merchandise must be priced, and it must be set up so that it will not fall under the weight of the merchandise. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E12.8.1 Read the manufacturer's instructions for setting up the display.

E12.8.2 Assemble the tools.

E12.8.3 Construct the display prop according to manufacturer's instructions.

E12.8.4 Assemble the merchandise to be put on display prop.

E12.8.5 Assemble price-marking tools and supplies.

E12.8.6 Clean prop and merchandise.

E12.8.7 Price merchandise as it is placed on prop.

E12.8.8 Dispose of debris.

E12.8.9 Put tools into storage.

CRITERION-REFERENCED MEASURE

C12.8 Manufacturer's display set up according to manufacturer's illustration with all items priced, and display able to hold weight of the merchandise. All safety procedures observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review proper unpacking procedures (E12.8.1-E12.8.3).
2. Have students read and interpret manufacturer's instructions for setting up display (E12.8.1).
3. Have students set up displays in accordance with manufacturer's specifications (E12.8.1-E12.8.9).

SELECTED TOOLS AND MATERIALS

Manufacturer's display and directions
Price-marking tools and supplies
Tools as needed

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 13.

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

12.9 Design and letter show cards

COURSE

Horticulture V (8038)

12.9

PERFORMANCE OBJECTIVE

P12.9 Given a display and access to show card lettering tools and supplies, design and letter a show card for the display. All items on instructor's checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E12.9.1 Write a plan for the show card including:

a. the selling features of the item and service
b. the size and color of the card that is to be used
c. the style of lettering that is to be used
d. the copy that is to be lettered on the show card.

E12.9.2 Assemble tools and materials.

E12.9.3 Determine the size of show card that is needed.

E12.9.4 Line off a show card stock with a hard lead pencil.

E12.9.5 Layout a show card so that it incorporates the principles of design.

CRITERION-REFERENCED MEASURE

C12.9 Show card designed and lettered with all items on instructor's checklist rated acceptable.

INSTRUCTOR'S CHECKLIST 12.9

DUTY: MAINTAINING AND DISPLAYING MERCHANDISE

TASK: Design and Letter Show Cards

ACTIVITY: Design and letter show cards for display

ITEM	RATING*	
	Acceptable	Unacceptable
The show card:		
1. Can easily be read by customers.		
2. Is factual, direct, and to the point.		
3. Is void of unnecessary words and distracting material.		
4. Is void of ink or paint smears, fingerprints, cuts and tears.		
5. Has lettering color in appropriate contrast with show card stock.		
6. Has lettering that is visible and in appropriate contrast to background material.		
7. Has layout that incorporates the principles of design.		
8. Incorporates the principles of lettering and spacing.		
9. Is in proportion to the size of the display.		
10. Is displayed in a location that will promote customer interest in the merchandise or service.		

*All items must receive acceptable rating.

Source: Retail Flower Shop Salesperson and Floral Designer. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss type of information required on a show card, and review principles of design (E12.9.1).
2. Display samples of completed show cards (E12.9.1-E12.9.5).
3. Have students design and letter show cards for a display or for greenhouse/shadehouse sales areas (E12.9.1-E12.9.5).
4. Invite an art teacher to present a demonstration on lettering and calligraphy (E12.9.1, E12.9.4).

SELECTED TOOLS AND MATERIALS

Lettering ink or paint
Lettering pens or brushes
Pencils
Ruler and square
Show card stock
Handout: Instructor's checklist

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Modern Argricultural Mechanics, pp. 10-11. Wakeman.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 8.

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

12.10 Set up counter and table-top displays

COURSE

Horticulture V (8038)

12.10

PERFORMANCE OBJECTIVE

P12.10 Given merchandise and display space, tools, and equipment, set up a counter or table-top display. All applicable items on instructor's checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E12.10.1 Write a plan for the display including:

- a. the theme or purpose
- b. a list of the merchandise to be used
- c. a list of the display accessories to be used
- d. a list of the show/price cards to be used
- e. a list of the tools and supplies to be used.

E12.10.2 Draw a sketch of how the display will appear when finished.

E12.10.3 Hand letter show and price cards (optional, may be printed).

E12.10.4 Assemble tools, merchandise, props, and accessories at the work area.

E12.10.5 Set up the display incorporating the following principles of design: balance, harmony, color and texture, scale and proportion, shape, focal area, repetition, and unity.

E12.10.6 Incorporate safety standards in the display.

E12.10.7 Remove debris and return unused items to storage.

CRITERION-REFERENCED MEASURE

C12.10 Counter or table-top display set up with all items on instructor's checklist rated acceptable.

INSTRUCTOR'S CHECKLIST 12.10

DUTY: MAINTAINING AND DISPLAYING MERCHANDISE

TASK: Set up Counter and Table-Top Displays

ACTIVITY: Set up a counter or table-top display

ITEM	RATING*	
	Acceptable	Unacceptable
The display:		
1. Attracts the attention of customers.		
2. Exhibits the following principles of design:		
a. balance		
b. harmony		
c. color and texture		
d. scale and proportion		
e. shape		
f. focal area		
g. repetition		
h. unity.		
3. Exhibits the following safety standards:		
a. props are structually designed to safely support displayed merchandise.		
b. placement of merchandise is arranged so that no safety hazards exist.		

*All items must receive acceptable rating.

INSTRUCTOR'S CHECKLIST 12.10 (continued)

DUTY:

TASK:

ACTIVITY: Set up a counter or table-top display

ITEM	RATING*	
	Acceptable	Unacceptable
c. lighting or other electrical fixtures are placed so that all safety requirements are met.		
d. flammable materials used in display are fire resistant as much as possible.		
e. does not block exits or entrances.		
f. free of sharp edges and corners.		
4. Does not include lighting or other display techniques that deliberately present a false impression of the merchandise.		
5. Includes clean and fresh merchandise.		
6. Is designed around a definite theme or purpose.		
7. Includes show cards or price tags that are informative, free of errors, dirt, smudges, and follow the purpose or theme of the display.		

*All items must receive acceptable rating.

Source: Retail Flower Shop Salesperson and Floral Designer. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review study of stocking shelves, designing show cards, and setting up manufacturer's display and relate to task (E12.10.1-E12.10.3).
2. Have students visit local retail shops and write a critique of counter and table-top displays (E12.10.1-E12.10.3).
3. Have students plan a display (E12.10.1, E12.10.2).
4. Have students set-up a counter or table-top display (E12.10.3-E12.10.7).

SELECTED TOOLS AND MATERIALS

Display space
Display tools and equipment
Merchandise
Show/price cards
Handout: Instructor checklist

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 9.
Retailing Principles and Practices, pp. 322-326. Reichert and others.

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

TASK/COMPETENCY

12.11 Arrange displays for salesroom cooler

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture V (8038)

12.11

PERFORMANCE OBJECTIVE

P12.11 Given a retail florist cooler and an assortment of cut flower vases and floral arrangements, arrange a display for the salesroom cooler. Arranged display must be aesthetically pleasing with all merchandise priced and displayed to its advantage, and the cooler must be clean, neat, and orderly. All applicable items on instructor's checklist must be rated acceptable, and all safety procedures observed.

SELECTED ENABLING OBJECTIVES

E12.11.1 Write a plan for the display including:
  a. the theme or purpose
  b. a list of the merchandise to be used
  c. a list of accessories to be used
  d. a list of show/price cards to be used
  e. a list of the tools and supplies to be used
  f. necessary safety precautions.
E12.11.2 Hand letter the show/price cards (optional, may be printed).
E12.11.3 Assemble tools, merchandise, props, and accessories at the work area.
E12.11.4 Clean the inside and outside surfaces of cooler.
E12.11.5 Incorporate the correct principles of design in the display.
E12.11.6 Avoid crowding either the arrangements or cut flowers.
E12.11.7 Place each arrangement and each cut flower vase in a manner so that each can be seen as an individual item.
E12.11.8 Set up a display that contains only fresh and clean props, merchandise, and accessories.
E12.11.9 Set up a display that includes show and price cards that are informative, free of errors, dirt, and smudges.
E12.11.10 Remove debris and return unused items to storage.

CRITERION-REFERENCED MEASURE

C12.11 Salesroom cooler displays arranged with all items on instructor's checklist rated acceptable and with all safety procedures observed.

INSTRUCTOR'S CHECKLIST 12.11

DUTY: MAINTAINING AND DISPLAYING MERCHANDISE

TASK: Arrange Displays for Salesroom Cooler

ACTIVITY: Arrange a display for the showroom cooler

ITEM	RATING*	
	Acceptable	Unacceptable
The display:		
1. Attracts the attention of customers.		
2. Exhibits the following principles of design:		
a. balance		
b. harmony		
c. color and texture		
d. scale and proportion		
e. shape		
f. focal area		
g. repetition		
h. unity.		
3. Exhibits the following safety standards:		
a. props are structually designed to safely support displayed merchandise.		
b. placement of merchandise is arranged so that no safety hazards exist.		

*All items must receive acceptable rating.

INSTRUCTOR'S CHECKLIST 12.11 (continued)

DUTY:

TASK:

ACTIVITY: Arrange a display for the showroom cooler

ITEM	RATING*	
	Acceptable	Unacceptable
c. lighting or other electrical fixtures are placed so that all safety requirements are met.		
d. flammable materials used in display are fire resistant as much as possible.		
e. does not block exits or entrances.		
f. free of sharp edges and corners.		
4. Does not include lighting or other display techniques that deliberately present a false impression of the merchandise.		
5. Includes clean and fresh merchandise.		
6. Is designed around a definite theme or purpose.		
7. Includes show cards or price tags that are informative, free of errors, dirt, smudges, and follow the purpose or theme of the display.		

*All items must receive acceptable rating.

Source: Retail Flower Shop Salesperson and Floral Designer. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide samples or illustrations or salesroom cooler displays (E12.11.1-E12.11.10).
2. Demonstrate how to build salesroom cooler displays (E12.11.1-E12.11.10).
3. Have students list safety precautions necessary when building and maintaining a cooler display (E12.11.1-E12.11.10).

SELECTED TOOLS AND MATERIALS

Cooler
Fresh arrangements
Fresh flowers
Show/price cards
Tools and equipment as required
Handout: Instructor's checklist

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 10.
Retailing Principles and Practices, pp. 322-326. Reichert and others.

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

12.12 Build window displays

COURSE

Horticulture V (8038)

12.12

PERFORMANCE OBJECTIVE

P12.12 Given merchandise, window display space, and tools and materials, build a window display. All items on instructor's checklist must be rated acceptable, and all safety precautions must be followed.

SELECTED ENABLING OBJECTIVES

E12.12.1 Write a plan for the display including:
  a. the theme or purpose
  b. a list of the merchandise to be used
  c. a list of the display accessories to be used
  d. a list of show/price cards to be used
  e. a list of the tools and supplies to be used.

E12.12.2 Draw a sketch of how the display will appear when finished.

E12.12.3 Prepare letter show/price cards, if needed.

E12.12.4 Assemble tools, merchandise, props, and accessories at the work area.

E12.12.5 Incorporate the correct principles of design in the display.

E12.12.6 Incorporate safety standards in the display.

E12.12.7 Set up the display to avoid the use of lighting or other display techniques that will present a false impression of the merchandise.

E12.12.8 Set up the display around a definite theme or purpose.

E12.12.9 Set up the display to include show and price cards that are informative, free of errors, dirt, smudges, and that follow the purpose or theme of the display.

E12.12.10 Remove debris and return unused items to storage.

CRITERION-REFERENCED MEASURE

C12.12 Window display built with all items on instructor's checklist rated acceptable, and all safety precautions observed.

INSTRUCTOR'S CHECKLIST 12.12

DUTY: MAINTAINING AND DISPLAYING MERCHANDISE

TASK: Build Window Displays

ACTIVITY: Build a window display

ITEM	RATING*	
	Acceptable	Unacceptable
The display:		
1. Attracts the attention of customers.		
2. Exhibits the following principles of design:		
a. balance		
b. harmony		
c. color and texture		
d. scale and proportion		
e. shape		
f. focal area		
g. repetition		
h. unity.		
3. Exhibits the following safety standards:		
a. props are structually designed to safely support displayed merchandise.		
b. placement of merchandise is arranged so that no safety hazards exist.		

*All items must receive acceptable rating.

DUTY:

TASK:

ACTIVITY: Build a window display

ITEM	RATING*	
	Acceptable	Unacceptable
c. lighting or other electrical fixtures are placed so that all safety requirements are met.		
d. flammable materials used in display are fire resistant as much as possible.		
e. does not block exits or entrances.		
f. free of sharp edges and corners.		
4. Does not include lighting or other display techniques that deliberately present a false impression of the merchandise.		
5. Includes clean and fresh merchandise.		
6. Is designed around a definite theme or purpose.		
7. Includes show cards or price tags that are informative, free of errors, dirt, smudges, and follow the purpose or theme of the display.		

*All items must receive acceptable rating.

Source: Retail Flower Shop Salesperson and Floral Designer. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students list appropriate themes and purposes for a window display (E12.12.1).
2. Have students observe window displays and discuss the principles of design (E12.12.1-E12.12.9).
3. Have students design and build a display in a school display case (E12.12.1-E12.12.10).

SELECTED TOOLS AND MATERIALS

Merchandise
Show and price cards
Tools and materials
Window space
Handout: Instructor's checklist

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 12.

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

12.13 Build exterior displays

COURSE

Horticulture V (8038)

12.13

PERFORMANCE OBJECTIVE

P12.13 Given merchandise suitable for outside display, display props, and tools and supplies, build an exterior display. All applicable items on the instructor's checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E12.13.1 Write a plan for the display including:

- a. the theme or purpose
- b. a list of the merchandise to be used
- c. a list of the display accessories to be used
- d. a list of the show/price cards to be used
- e. a list of the tools and supplies to be used.

E12.13.2 Draw a sketch of how the display will appear when finished.

E12.13.3 Design and hand letter show/price cards to be used.

E12.13.4 Assemble tools, merchandise, props, and accessories at the work area.

E12.13.5 Incorporate the following principles of display: balance, harmony, scale and texture, scale and proportion, shape, focal area, repetition, and unity.

E12.13.6 Remove debris and return unused items to storage.

CRITERION-REFERENCED MEASURE

C12.13 Exterior display built with all applicable items on instructor's checklist rated acceptable.

INSTRUCTOR'S CHECKLIST 12.13

DUTY: MAINTAINING AND DISPLAYING MERCHANDISE

TASK: Build Exterior Displays

ACTIVITY: Build an exterior display

ITEM	RATING*	
	Acceptable	Unacceptable
The display:		
1. Attracts the attention of customers.		
2. Exhibits the following principles of design:		
a. balance		
b. harmony		
c. color and texture		
d. scale and proportion		
e. shape		
f. focal area		
g. repetition		
h. unity.		
3. Exhibits the following safety standards:		
a. props are structually designed to safely support displayed merchandise.		
b. placement of merchandise is arranged so that no safety hazards exist.		

*All items must receive acceptable rating.

DUTY:

TASK:

ACTIVITY: Build an exterior display

ITEM	RATING*	
	Acceptable	Unacceptable
c. lighting or other electrical fixtures are placed so that all safety requirements are met.		
d. flammable materials used in display are fire resistant as much as possible.		
e. does not block exits or entrances.		
f. free of sharp edges and corners.		
4. Does not include lighting or other display techniques that deliberately present a false impression of the merchandise.		
5. Includes clean and fresh merchandise.		
6. Is designed around a definite theme or purpose.		
7. Includes show cards or price tags that are informative, free of errors, dirt, smudges, and follow the purpose or theme of the display.		

*All items must receive acceptable rating.

Source: Retail Flower Shop Salesperson and Floral Designer. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display models or illustrations of exterior displays (E12.13.1-E12.13.6).
2. Have students observe exterior displays and discuss the principles of design (E12.13.1-E12.13.6).
3. Assist students in designing and building exterior displays (E12.13.1-E12.13.6).

SELECTED TOOLS AND MATERIALS

Merchandise
Show/price cards
Tools and equipment
Handout: Instructor's checklist

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 11.
Retail Florist, Teacher's Guide, pp. 218-222. Illinois Office of Education.

DUTY AREA

12. MAINTAINING AND DISPLAYING MERCHANDISE

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

12.14 Price merchandise

COURSE

Horticulture V (8038)

12.14

PERFORMANCE OBJECTIVE

P12.14 Given merchandise, pricing information and necessary supplies, price the merchandise. Merchandise must be priced in accordance with instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E12.14.1 Identify factors involved in establishing the price for merchandise.

E12.14.2 Identify various methods of marking the price on merchandise.

CRITERION-REFERENCED MEASURE

C12.14 Merchandise priced in accordance with instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Visit a retail establishment to have the students practice using a pricing gun (E12.14.2).
2. Have student practice pricing merchandise (E12.14.1, E12.14.2).
3. Have students discuss factors to consider when pricing merchandise (E12.14.2).

SELECTED TOOLS AND MATERIALS

Pricing gun
Sticker
Labels
Handout: Instructor guidelines

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Operation and Management, pp. 113-114. Pennsylvania State University.
Nursery Production. V-TECS. Performance Objective 51.

DUTY AREA

13. SELLING HORTICULTURAL PRODUCTS

TASKS/COMPETENCIES

13.1 Provide customer with product information

13.2 Wrap merchandise

13.3 Write messages on enclosure cards

13.4 Write sales tickets and receive payments

13.5 Write up telephone orders

13.6 Route deliveries

13.7 Wire flowers by telephone

DUTY AREA

13. SELLING HORTICULTURAL PRODUCTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

13.1 Provide customer with product information

COURSE

Horticulture V (8038)

13.1

PERFORMANCE OBJECTIVE

P13.1 Given an actual or simulated florist shop or garden center, requests for information about flowers, plants, or other products, and the necessary references, provide customer(s) with product information. All applicable items on instructor's checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E13.1.1 Confer with customer regarding price and type of plant floral arrangements needed.

E13.1.2 Suggest plants suitable for specific growing conditions.

E13.1.3 Apply knowledge of social and religious customs.

E13.1.4 Provide instructions concerning the following:

- a. water requirements
- b. humidity requirements
- c. fertilizer requirements
- d. growth characteristics
- e. light requirements
- f. temperature requirements
- g. disease and insect control
- h. repotting requirements.

E13.1.5 Answer customer's questions about plant care and culture.

E13.1.6 Provide customer with care card, if available.

CRITERION-REFERENCED MEASURE

C13.1 Customer(s) provided with production information; all applicable items on instructor's checklist rated acceptable.

INSTRUCTOR'S CHECKLIST 13.1

DUTY: SELLING HORTICULTURAL PRODUCTS

TASK: Provide Customer With Product Information

ACTIVITY: Provide a customer with product information

ITEM	RATING*	
	Acceptable	Unacceptable
The student:		
1. Referred to plant reference if unsure of specific cultural needs of the specific plant.		
2. Provided accurate price information.		
3. Explained the water, humidity, fertilizer, light, and temperature requirements.		
4. Described growth characteristics.		
5. Explained disease and insect control.		
6. Explained repotting requirements.		
7. Answered customer's questions courteously.		

*All items must receive acceptable rating.

Source: Retail Flower Shop Salesperson and Floral Designer. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with plant references, care cards, or other sources of product information (E13.1.1-E13.1.6).
2. Discuss types of plants or arrangements suitable for various religious or social occasions (E13.1.1-E13.1.3).
3. Have students participate in role-playing exercises simulating customer's requests for information (E13.1.1-E13.1.3).
4. Videotape and/or tape record student's role-playing activities and have class critique (E13.1.1-E13.1.6).
5. Invite an owner of a local greenhouse or nursery to speak to class about common customer requests and questions (E13.1.4, E13.1.5).

SELECTED TOOLS AND MATERIALS

Care cards
Merchandise
Plant references
Handout: Instructor's checklist

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Operation and Management, pp. 116-121. Pennsylvania State University.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 45.

DUTY AREA

13. SELLING HORTICULTURAL PRODUCTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

13.2 Wrap merchandise

COURSE

Horticulture V (8038)

13.2

PERFORMANCE OBJECTIVE

P13.2 Given instructor's demonstration, boxed items, potted plants, floral arrangements, dish gardens, and access to wrapping tools and supplies, gift wrap items, if necessary, and wrap all items in order to protect items from adverse weather. Gift items must exhibit color-coordinated wrap, ribbon, and bows: the wrap must be taped and securely fastened to the packages; all packages must be free of smudges, and all items must be wrapped for protection against adverse weather conditions.

SELECTED ENABLING OBJECTIVES

E13.2.1 Assemble tools and supplies at the work area.

E13.2.2 Remove all price tags from the merchandise.

E13.2.3 Wrap boxed gifts.

E13.2.4 Wrap potted plants.

E13.2.5 Wrap a floral arrangement.

E13.2.6 Wrap a terrarium or dish garden.

CRITERION-REFERENCED MEASURE

C13.2 Merchandise gift wrapped and wrapped according to instructor's demonstration. Gift wrapped items have color-coordinated wrap, ribbon, and bows. Wrap taped and fastened securely; packages free of smudges, and all items wrapped for protection against adverse weather conditions.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Give demonstrations on how to gift wrap boxed items and on how to wrap various products to protect items from adverse weather conditions (E13.2.1-E13.2.6).
2. Provide students with a list of plants and have them suggest color wrap, ribbon, and bows to coordinate with each plant (E13.2.3-E13.2.6).
3. Have students practice wrapping gift packages and wrapping various plant or floral products (E13.2.1-E13.2.6).

SELECTED TOOLS AND MATERIALS

Merchandise
Scissors
Cellophane tape
Ribbon
Gift wrap paper
Tie-ons
Floral tissue paper
Staple
Staple gun
Care cards
Plant sleeves

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objectives 46 and 49.

DUTY AREA

13. SELLING HORTICULTURAL PRODUCTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

13.3 Write messages on enclosure cards

COURSE

Horticulture V (8038)

13.3

PERFORMANCE OBJECTIVE

P13.3 Given five enclosure cards and messages, write the messages on the cards. The messages must be written legibly and without spelling errors.

SELECTED ENABLING OBJECTIVES

E13.3.1 Select a card that is appropriate for the message.

E13.3.2 Write the name of the person who is to receive the merchandise on the envelope.

E13.3.3 Insert the card into the envelope.

E13.3.4 Attach the card to the ordered item.

CRITERION-REFERENCED MEASURE

C13.3 Messages written on enclosure cards correctly, legibly, and without spelling errors.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display illustrations or samples of enclosure cards (E13.3.1).
2. Have students practice writing enclosure cards and attaching cards to plants (E13.3.1-E13.3.4).
3. Devise a list of situations in which a customer telephones in a message for a card. Have students work in small groups role-playing the situations. Review and discuss students' work (E13.3.1-E13.3.3).

SELECTED TOOLS AND MATERIALS

Enclosure cards
Writing material

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 51.

DUTY AREA

13. SELLING HORTICULTURAL PRODUCTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

13.4 Write sales tickets and receive payments

COURSE

Horticulture V (8038)

13.4

PERFORMANCE OBJECTIVE

P13.4 Given an order for a plant or floral arrangement, a pad of sales invoices, and other necessary information and supplies, write a sales ticket and receive payment. All information on the sales ticket and/or credit card transaction forms must be complete and accurate, and correct change must be returned to the buyer in cash transactions.

SELECTED ENABLING OBJECTIVES

E13.4.1 Identify components of a sales ticket.

E13.4.2 Complete credit card forms, and receive authorization.

E13.4.3 Authorize checks, according to organization policy.

E13.4.4 Operate cash register, if available.

E13.4.5 Return accurate change to customer.

E13.4.6 Provide customer with receipt.

CRITERION-REFERENCED MEASURE

C13.4 Sales ticket written correctly and accurately and payment received. In cash transactions, correct change given; in charge card transactions, credit card form completed correctly.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Invite a bank representative to discuss with class charge card transactions, authorization procedures, and related information (E13.4.2).
2. Provide students with sample shop invoices, and have them practice completing the forms (E13.4.1).
3. Have students work in small groups and role-play customer-salesperson situations, and practice completing cash and credit card transactions (E13.4.1-E13.4.6).

SELECTED TOOLS AND MATERIALS

Cash register
Credit cards and related forms and supplies
Sales slips or contracts

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retailing Principles and Practices, pp. 84-91. Reichert and others.

—— Application ——

DUTY AREA

13. SELLING HORTICULTURAL PRODUCTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

13.5 Write up telephone orders

COURSE

Horticulture V (8038)

13.5

PERFORMANCE OBJECTIVE

P13.5 Given a customer making an order by telephone and an order pad, write up a telephone order. The order must include customer's name and account number, merchandise requested, and delivery instructions as verified by the caller.

SELECTED ENABLING OBJECTIVES

E13.5.1 Answer the telephone in accordance with shop procedure.

E13.5.2 Speak clearly, using a friendly tone of voice.

E13.5.3 Quote prices of merchandise.

E13.5.4 Write names and all information legibly and without spelling errors.

E13.5.5 Write delivery instructions.

E13.5.6 Write enclosure card message.

E13.5.7 Verify customer's charge account.

E13.5.8 Write the name and address of the recipient.

E13.5.9 Read the finished order to the caller.

E13.5.10 Close the telephone call.

CRITERION-REFERENCED MEASURE

C13.5 Telephone order written up including customer's name, account number, merchandise requested, and delivery instructions; order verified by caller.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Invite a speech or drama teacher to give a presentation to class on effective speaking techniques (E13.5.1-E13.5.3, E13.5.8-E13.5.10).
2. Have students list characteristics of courteous and effective business telephone usage (E13.5.1).
3. Demonstrate how to write telephone orders (E13.5.1-E13.5.10).
4. Provide students with written scripts to enact a telephone transaction. Tape record the transaction and have students critique (E13.5.1-E13.5.10).

SELECTED TOOLS AND MATERIALS

Telephone
Order pads

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 50.
Retail Flower Shop Operation and Management, pp. 121-122. Pennsylvania State University.

DUTY AREA

13. SELLING HORTICULTURAL PRODUCTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

13.6 Route deliveries

COURSE

Horticulture V (8038)

13.6

PERFORMANCE OBJECTIVE

P13.6 Given the day's delivery slips, a local map, and a city directory, route the deliveries of merchandise. The route should be planned so that deliveries going to the same geographical area are grouped together, deliveries with specified time requirements are so noted, and the completed plan can be easily read and interpreted by the delivery person.

SELECTED ENABLING OBJECTIVES

E13.6.1 Read the city directory and locate the area of town where each item of merchandise is to be delivered.

E13.6.2 Identify group deliveries that are going to the same area.

E13.6.3 List, using map, each delivery in a logical, geographical sequence for delivery.

E13.6.4 Consider the following factors when writing plans for the delivery:

a. request times made by customers
b. closing hours of business
c. traffic patterns
d. plant needs.

E13.6.5 Write plan clearly so that delivery person can read and easily interpret it.

CRITERION-REFERENCED MEASURE

C13.6 Deliveries of merchandise routed so that deliveries in same geographical area are grouped together, deliveries with specified time requirements are so noted, and completed plan is legible and understandable.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with a map of the local vicinity and have them practice locating specific streets (E13.6.1-E13.6.4).
2. Have students list factors to consider in routing deliveries, such as specified times, traffic patterns, one-way streets, and business hours (E13.6.4).
3. Demonstrate procedures for routing deliveries (E13.6.1-E13.6.5).
4. Have students practice routing the deliveries of merchandise for hypothetical situations (E13.6.1-E13.6.5).

SELECTED TOOLS AND MATERIALS

Directories and maps
Merchandise
Order forms

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 47.

DUTY AREA

13. SELLING HORTICULTURAL PRODUCTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

13.7 Wire flowers by telephone

COURSE

Horticulture V (8038)

13.7

PERFORMANCE OBJECTIVE

P13.7 Given an order for floral merchandise that is to be sent by wire service and access to a telephone, wire flowers by telephone. The recipient of the call must be able to verify the following from the information supplied: the name and code number of the wire service, the name of the calling florist, a description of the merchandise, the name and address of the recipient, the message for the enclosure card, and the requested time of delivery.

SELECTED ENABLING OBJECTIVES

E13.7.1 Call the florist who is to receive the order.

E13.7.2 Provide the following information:

a. the name of the wire service being used
b. the name, state, and town of the calling florist
c. the wire service code number
d. a description of the customer's order (or second choice)
e. the name and address of the receipient (spell uncommon names)
f. the message for the enclosure card
g. the delivery date.

E13.7.3 Complete the call.

CRITERION-REFERENCED MEASURE

C13.7 Flowers wired by telephone. Name and code number of wire service, name of calling florist, description of merchandise, name and address of recipient, message for enclosure card, and requested time of delivery made accurately as verified by recipient of call.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Invite a florist to discuss with class the workings of flower wire service systems (E13.7.1-E13.7.3).
2. Review study of writing up telephone orders (E13.7.2).
3. Have students role-play placing and receiving flowers-by-wire orders (E13.7.1-E13.7.3).

SELECTED TOOLS AND MATERIALS

Telephone
Order forms

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 48.
Ornamental Horticulture, pp. 334-335. McDaniel.

DUTY AREA

14. ORGANIZING WORK AND KEEPING RECORDS

TASKS/COMPETENCIES

14.1 Write monthly statements

14.2 Keep business records

14.3 Keep production records

14.4 Keep maintenance records

14.5 Keep cultivation records

14.6 Keep an inventory of plants, equipment, and supplies

14.7 Call merchandise orders to suppliers

DUTY AREA

14. ORGANIZING WORK AND KEEPING RECORDS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

14.1 Write monthly statements

COURSE

Horticulture IV (8036)

14.1

PERFORMANCE OBJECTIVE

P14.1 Given a customer's charge ledger and a monthly billing form, write the customer's monthly statement. The statement must include customer's name and address; cost description and date(s) of purchases; balance paid and/or due from previous month; and total of current charges. Statement must agree in all respects with instructor's control statement.

SELECTED ENABLING OBJECTIVES

E14.1.1 Outline procedure for preparing monthly statements.

E14.1.2 Locate required information from customer's charge account ledger.

E14.1.3 Write the customer's full name and address on the billing form.

E14.1.4 Write a description of merchandise purchased, cost, and the date when purchased.

E14.1.5 Write the balance due that customer has on account.

E14.1.6 Write the amount that customer paid on the previous month's charges.

E14.1.7 Write the total charges made during the current charge period.

E14.1.8 Add the total charges made during the current charge period to the balance due and enter this in the appropriate space (total due).

CRITERION-REFERENCED MEASURE

C14.1 Monthly statements written, including customer's name and address, cost description and date(s) of purchases, balance paid and/or due from previous month, and total of current charges; statement in concurrence with instructor's control statement.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with sample billing forms, ledger, and statement forms and discuss (E14.1.1-E14.1.4).
2. Obtain sample invoice and monthly statement forms from a variety of sources and review with students. Discuss advantages and disadvantages of each (E14.1.1-E14.1.8).
3. Have students prepare statements for a class or FFA project (E14.1.1-E14.1.8).

SELECTED TOOLS AND MATERIALS

Statement forms
Invoice forms
Sample ledgers

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Nursery Worker--Student Manual. Ohio Curriculum Materials.
Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 43.

DUTY AREA

14. ORGANIZING WORK AND KEEPING RECORDS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

14.2 Keep business records

COURSE

Horticulture IV (8036)

14.2

PERFORMANCE OBJECTIVE

P14.2 Given the necessary record forms and the data to be recorded, maintain nursery, greenhouse, and floral shop business records in accordance with instructor's guidelines. All entries must be on the proper forms, and all data must be recorded without error.

SELECTED ENABLING OBJECTIVES

E14.2.1 Identify the types of business records required.

E14.2.2 Plan record keeping procedure:

a. Organize a system for keeping necessary data.
b. Gather relevant data and forms.
c. Organize a filing system.

E14.2.3 Record data:

a. Read record forms.
b. Record pertinent data on forms.
c. Keep recorded data up-to-date.
d. Check completed forms for accuracy.
e. Report and file recorded data appropriately.

CRITERION-REFERENCED MEASURE

C14.2 Business records kept on proper forms and without error in accordance with instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students prepare and maintain income-expense records for production, design, and service projects (E14.2.1-E14.2.3).
2. Have students review previous business records to propose project changes and budgets (E14.2.1-E14.2.3).
3. Have students practice keeping records on computers (E14.2.3).

SELECTED TOOLS AND MATERIALS

Record forms
Examples of records
Handout: Instructor's guidelines

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Greenhouse Operation and Management, 2 ed., pp. 519-535. Nelson.
Nursery Production. V-TECS. Performance Objective 4.
The Nursery Worker--Student Manual. Ohio Curriculum Materials.
Virginia Supervised Occupational Experience Record Book. McMillion.

DUTY AREA

14. ORGANIZING WORK AND KEEPING RECORDS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

14.3 Keep production records

COURSE

Horticulture IV (8036)

14.3

PERFORMANCE OBJECTIVE

P14.3 Given a nursery or greenhouse facility, the necessary record forms, and the data to be recorded, keep production records in accordance with instructor's guidelines. All entries must be on the proper forms, and all data must be recorded without error.

SELECTED ENABLING OBJECTIVES

E14.3.1 Identify types of greenhouse or production records, and explain uses.

E14.3.2 Plan record keeping procedure:

a. Organize a system for keeping necessary data.
b. Gather relevant data and forms.
c. Organize a filing system.

E14.3.3 Record data:

a. Read record forms.
b. Record pertinent data on forms.
c. Keep recorded data up-to-date.
d. Check completed forms for accuracy.
e. Report and file recorded data appropriately.

CRITERION-REFERENCED MEASURE

C14.3 Production records kept on proper forms and without error in accordance with instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students prepare records of class production projects, including all components of supplies and equipment used, cultural manipulations, time expended, and product results (E14.3.1-E14.3.3).
2. Have students review past project production records and prepare an outline of the expected schedule and propose changes to the schedule (E14.3.1-E14.3.3).
3. Organize a panel comprised of representatives of local greenhouses, florists, and the extension service to discuss various methods of keeping production records (E14.3.1).

SELECTED TOOLS AND MATERIALS

Record forms
Samples of production records
Handout: Instructor's guidelines

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Greenhouse Operation and Management, 2nd ed., pp. 519-535. Nelson.
Nursery Production. V-TECS. Performance Objective 4.
The Nursery Worker--Student Manual. Ohio Curriculum Materials.
Virginia Supervised Occupational Experience Record Book. McMillion.

DUTY AREA

14. ORGANIZING WORK AND KEEPING RECORDS

TASK/COMPETENCY

14.4 Keep maintenance records

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

14.4

PERFORMANCE OBJECTIVE

P14.4 Given a greenskeeping, nursery, greenhouse, or retail florist facility, the necessary record forms, and the data to be recorded, keep maintenance records in accordance with instructor's guidelines. All entries must be on the proper forms, and data must be recorded without error.

SELECTED ENABLING OBJECTIVES

E14.4.1 Determine facility maintenance schedule.

E14.4.2 Plan record keeping procedure:

- a. Organize a system for keeping necessary data.
- b. Gather relevant data and forms.
- c. Organize a filing system.

E14.4.3 Record data:

- a. Read record forms.
- b. Record pertinent data on forms.
- c. Keep recorded data up-to-date.
- d. Check completed forms for accuracy.
- e. Post, report, and/or file recorded data appropriately.

CRITERION-REFERENCED MEASURE

C14.4 Maintenance records kept on proper forms and without error in accordance with instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students prepare and maintain records on maintenance of power and hand tools, vehicles, and mechanical equipment in the training center (E14.4.1-E14.4.3).
2. Have students review prior maintenance records and equipment service guides and prepare a chart listing maintenance frequencies for power equipment in the training center (E14.4.1-E14.4.3).
3. Invite a computer salesperson to demonstrate record keeping procedures on a computer (E14.4.1-E14.4.3).

SELECTED TOOLS AND MATERIALS

Record forms
Samples of maintenance records
Handout: Instructor's guidelines

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Greenhouse Operation and Management, 2nd ed., pp. 519-535. Nelson.
Nursery Production. V-TECS. Performance Objective 4.
The Nursery Worker--Student Manual. Ohio Curriculum Materials.
Virginia Supervised Occupational Experience Record Book. McMillion.

DUTY AREA

14. ORGANIZING WORK AND KEEPING RECORDS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

14.5 Keep cultivation records

COURSE

Horticulture IV (8036)

14.5

PERFORMANCE OBJECTIVE

P14.5 Given a nursery, greenhouse, or land laboratory facility, the necessary record forms, and the data to be recorded, keep cultivation records in accordance with instructor's guidelines. All entries must be on proper forms, and all data must be recorded without error.

SELECTED ENABLING OBJECTIVES

E14.5.1 Identify type of cultivation records needed.

E14.5.2 Plan record keeping procedure:

a. Organize a system for keeping necessary data.
b. Gather relevant data and forms.
c. Organize a filing system.

E14.5.3 Record data:

a. Read record forms.
b. Record pertinent data on forms.
c. Keep recorded data up-to-date.
d. Check completed forms for accuracy.
e. File recorded data appropriately.

CRITERION-REFERENCED MEASURE

C14.5 Cultivation records kept on proper forms and without error in accordance with instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students prepare and maintain records on cultivation and other maintenance activities for plants and crops in the greenhouse, shadehouse, and land laboratory (E14.5.1-E14.5.3).
2. Have students prepare records for a model landscape maintenance enterprise on the school campus (E14.5.1-E14.5.3).
3. Arrange for students to visit a local facility to see actual cultivation records and procedures (E14.5.2-E14.5.3).

SELECTED TOOLS AND MATERIALS

Record forms
Samples of cultivation records
Handout: Instructor's guidelines

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Greenhouse Operation and Management, 2nd ed., pp. 519-535. Nelson.
Nursery Production. V-TECS. Performance Objective 4.
The Nursery Worker--Student Manual. Ohio Curriculum Materials.
Virginia Supervised Occupational Experience Record Book. McMillion.

DUTY AREA

14. ORGANIZING WORK AND KEEPING RECORDS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

14.6 Keep an inventory of plants, equipment, and supplies

COURSE

Horticulture IV (8036)

14.6

PERFORMANCE OBJECTIVE

P14.6 Given an up-to-date inventory of plants, equipment, and supplies, and an established system of purchasing and supply checkout, keep an inventory of plants, equipment, and supplies of all items in the training center for a period of one month. Student inventory totals must match instructor totals on an item-by-item check at the end of the period.

SELECTED ENABLING OBJECTIVES

E14.6.1 Study carefully the established system of purchasing and supply checkout.

E14.6.2 Revise system for improving efficiency and reducing costs, if possible. Include means for recording items in stock, items checked out, and items purchased.

E14.6.3 Record daily items checked out and items purchased.

E14.6.4 Check items in stock at the end of each week.

E14.6.5 Identify and list items which need to be reordered or replaced.

CRITERION-REFERENCED MEASURE

C14.6 Supplies, equipment, and plants inventoried accurately over the period of one month; inventory totals match instructor's totals on a item-by-item check.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss inventory procedures in class and have students suggest ways to improve procedures (E14.6.1-E14.6.2).
2. Have students practice inventory work by maintaining an inventory of floral shop supplies and flowers in the training center (E14.6.1-E14.6.5).
3. Have students review and verify school inventory listing of permanent equipment in the horticulture facilities (E14.6.3-E14.6.5).

SELECTED TOOLS AND MATERIALS

Record forms

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 85.
Gardening-Groundskeeping Equipment. V-TECS. Performance Objective 22.
Nursery Production. V-TECS. Performance Objective 59.
Virginia Supervised Occupational Experience Record Book. McMillion.

DUTY AREA

14. ORGANIZING WORK AND KEEPING RECORDS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

14.7 Call merchandise orders to suppliers

COURSE

Horticulture IV (8036)

14.7

PERFORMANCE OBJECTIVE

P14.7 Given a shop order for merchandise and access to a telephone, call merchandise order to suppliers. All items on the instructor's checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E14.7.1 Read the order to determine that all merchandise is clearly listed.
E14.7.2 Place the call to the supplier.
E14.7.3 Identify self and name of florist.
E14.7.4 State the name of the merchandise and the quantity.
E14.7.5 Verify order by having it read back.
E14.7.6 Make note of any item that supplier cannot supply.
E14.7.7 Make second choices, if necessary.
E14.7.8 Specify pick up or delivery.
E14.7.9 Indicate date of order.

CRITERION-REFERENCED MEASURE

C14.7 Merchandise order called in to supplier with all items on instructor's checklist rated acceptable.

INSTRUCTOR'S CHECKLIST 14.7

DUTY: ORGANIZING WORK AND KEEPING RECORDS

TASK: Call Merchandise Orders to Suppliers

ACTIVITY: Call merchandise orders to suppliers

ITEM	RATING*	
	Acceptable	Unacceptable
The student:		
1. Identified self and name of florist to the order clerk.		
2. Placed the order by giving the order clerk the name of each item and the quantity needed.		
3. Asked the order clerk to verify the complete order.		
4. Noted each item that was not available.		
5. Requested substitutes for unavailable items.		
6. Specified if the order was to be picked up or delivered.		
7. Requested and noted a delivery date for the order.		

*All items must receive acceptable rating.

Source: Retail Flower Shop Salesperson and Floral Designer. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students list possible suppliers and places to order particular items (E14.7.1, E14.7.2).
2. Provide students with a sample order and have them discuss all areas of order, including suitable substitute items, delivery dates, and relative prices (E14.7.1-E14.7.7, E14.7.9).
3. Have students role play placing an order and tape record their work. Play back the recording and review any errors (E14.7.1-E14.7.9).

SELECTED TOOLS AND MATERIALS

Merchandise order list
Handout: Instructor's checklist

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Retail Flower Shop Salesperson and Floral Designer. V-TECS. Performance Objective 44.

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

TASKS/COMPETENCIES

15.1	Haul and spread topsoil
15.2	Grade soil
15.3	Prepare seedbed for turf
15.4	Sow grass seed
15.5	Establish turf by vegetative methods
15.6	Transplant bare-root trees and shrubs
15.7	Transplant balled and burlapped trees and shrubs
15.8	Transplant container trees and shrubs
15.9	Brace newly planted trees
15.10	Plant annual flowers
15.11	Plant bulbs and related structures
15.12	Plan and draw small scale landscape designs
15.13	Plan and draw interior landscape designs
15.14	Install landscape according to plan
15.15	Install interior landscape according to plan

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

15.1 Haul and spread topsoil

COURSE

Horticulture IV (8036)

15.1

PERFORMANCE OBJECTIVE

P15.1 Given an area void of topsoil and the necessary tools and equipment, haul and spread topsoil on the designated area to a depth of 10 to 12 inches.

SELECTED ENABLING OBJECTIVES

E15.1.1 Assess quality of topsoil.

E15.1.2 Locate and mark fill stakes for proper depth.

E15.1.3 Choose transportation route.

E15.1.4 Load wheelbarrow.

E15.1.5 Transport and deposit topsoil on area.

E15.1.6 Spread topsoil to desired depth.

E15.1.7 Level topsoil with rake.

CRITERION-REFERENCED MEASURE

C15.1 Topsoil hauled and spread to a depth of 10 to 12 inches.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide samples of varying quality of topsoils (E15.1.1).
2. Demonstrate how to haul and spread topsoil (E15.1.1-E15.1.7).
3. Have students haul and spread topsoil (E15.1.1-E15.1.7).
4. Show slides and discuss (E15.1.1-E15.1.7).

SELECTED TOOLS AND MATERIALS

Wheelbarrow
Fill stakes
Hoe
Shovel
Rake
String

SELECTED AUDIOVISUAL MATERIALS

Slides: Lawn Renovation and Reestablishment. Ohio Curriculum Materials.

SELECTED REFERENCES

Ornamental Horticulture, pp. 416-418. McDaniel.

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

15.2 Grade soil

COURSE

Horticulture IV (8036)

15.2

PERFORMANCE OBJECTIVE

P15.2 Given a designated area and suitable equipment, grade the soil. The graded area must be level and smooth throughout, have no holes or visible pockets, and be sufficiently even in its contour to permit close mowing without scalping.

SELECTED ENABLING OBJECTIVES

E15.2.1 Service and prepare equipment.

E15.2.2 Drag the area either in lanes or by walking from one side of the area to the other, swath by swath.

E15.2.3 Decide whether or not it is necessary to go over the area a second time at right angles to the pattern followed the first time.

CRITERION-REFERENCED MEASURE

C15.2 Soil graded so that it is level and smooth throughout, has no holes or visible pockets, and is sufficiently even in contour to permit close mowing without scalping.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review procedures for servicing and preparing equipment (E15.2.1).
2. Demonstrate how to grade soil (E15.2.2, E15.2.3).
3. Have students practice grading top soil, using dragging and swath by swath methods (E15.2.1-E15.2.3).
4. Discuss conditions which warrant grading the soil a second time (E15.2.3).

SELECTED TOOLS AND MATERIALS

Drag
Spade
Rake
Wheelbarrow

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Grounds Keeping Equipment, Volume I. AAVIM.
Landscaping, 2nd ed., pp. 72-78. Ingels.
Landscaping Design, pp. 75-80, 98-99. Hannebaum.

—— Application ——

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

15.3 Prepare seedbed for turf

COURSE

Horticulture IV (8036)

15.3

PERFORMANCE OBJECTIVE

P15.3 Given a soil analysis, fertilizer, and the necessary tools and equipment, prepare a seedbed for turf. Tillage depth should extend 5 to 7 inches, and top soil surface must be smooth.

SELECTED ENABLING OBJECTIVES

E15.3.1 Remove debris, if necessary.

E15.3.2 Thoroughly till the area.

E15.3.3 Apply fertilizer uniformly over entire area at rate recommended by soil test report.

E15.3.4 Incorporate fertilizer uniformly in upper 6 inches of soil.

E15.3.5 Rake soil surface smooth.

CRITERION-REFERENCED MEASURE

C15.3 Seedbed prepared for turf with tillage extending 5 to 7 inches in depth and top surface smooth.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with a copy of a sample soil analysis, and have them discuss (E15.3.3).
2. Review tilling soil tasks--4.13, 4.14 (E15.3.1, E15.3.2).
3. Demonstrate how to prepare a seedbed for turf (E15.3.1-E15.3.5).

SELECTED TOOLS AND MATERIALS

Rake
Stakes
Steel tape
String
Tiller

Soil test report
Granular fertilizer

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette:	Lawns and Ground Covers. Vocational Education Productions.
Slides:	Lawn Care and Maintenance. Ohio Curriculum Materials.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objectives 16 and 17.
Grounds Keeping Equipment, Volume 1. AAVIM.
Turfgrass Guide, pp. 6-8, Publication 311. Virginia Cooperative Extension Service.
Turfgrass Maintenance Workers. V-TECS. Performance Objective 65.

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

15.4 Sow grass seed

COURSE

Horticulture IV (8036)

15.4

PERFORMANCE OBJECTIVE

P15.4 Given a specified grass seed, a well prepared seedbed, gravity and cyclone type seeders, and other required equipment, sow the grass seed. All items on the instructor's checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E15.4.1 Inspect the field or land to be seeded to determine the conditions and the type of seeder that should be used.

E15.4.2 Determine the species and variety of grass seed to be established.

E15.4.3 Determine the seeding rate.

E15.4.4 Calibrate the seeder.

E15.4.5 Cover the seed lightly with soil and/or roll.

E15.4.6 Irrigate newly seeded area.

E15.4.7 Apply mulch to a newly seeded area.

E15.4.8 Clean all tools and equipment used and return to storage.

CRITERION-REFERENCED MEASURE

C15.4 Grass seed sown with all items on instructor's checklist rated acceptable.

INSTRUCTOR'S CHECKLIST 15.4

DUTY: ESTABLISHING LANDSCAPES AND TURFS

TASK: Sow Grass Seed

ACTIVITY: Sow grass seed in a prepared seedbed

ITEM	RATING*	
	Acceptable	Unacceptable
1. Proper species and seed variety selected.		
2. Condition of area to be seeded determined prior to selection of seeder and other equipment.		
3. The selection of seeder and other equipment based on field conditions as determined and are suitable.		
4. Equipment selected for use serviced and its performance checked prior to use.		
5. Seeder calibrated to deliver the prescribed amount of seed per acre.		
6. Seed planted at proper depth and evenly and uniformly distributed over entire area.		
7. Fertilizer, if not previously added and mixed into soil, applied at the same time or immediately following seeding.		
8. Seed, if not drilled into the soil, covered at the appropriate depth by suitable means.		
9. Irrigation applied after seeding.		
10. Mulch completed after seeding.		
11. All tools and equipment cleaned following use and returned to their proper place in the storage area.		

*All items must receive acceptable rating.

Source: Turfgrass Maintenance Workers. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display seeders and discuss their characteristics (E15.4.1).
2. Have students inspect several areas of the school grounds to determine the conditions and type of seeder to use (E15.4.1).
3. Discuss characteristics of various types of grass seed (E15.4.2).
4. Have the students determine the species and variety of grass seed that should be established on several areas (E15.4.2).
5. Have the students determine seeding rate (E15.4.3).
6. Have the students calibrate the seeder (E15.4.4).
7. Outline procedure for sowing grass seed (E15.4.1-E15.4.8).
8. Have the students sow grass seed (E15.4.5-E15.4.8).

SELECTED TOOLS AND MATERIALS

Fertilizer, if needed
Mulch
Grass seed--various types
Seeders (gravity and cyclone)
Oil or other protective coating
Irrigation equipment
Handout: Instructor's checklist

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette:	Lawns and Ground Covers. Vocational Education Productions.
Slides:	Lawn Care and Management. Ohio Curriculum Materials.

SELECTED REFERENCES

Turfgrass Guide, pp. 5-8, Publication 311. Virginia Cooperative Extension Service.
Turfgrass Maintenance Workers. V-TECS. Performance Objective 66.
Turfgrass Management. Ohio Curriculum Materials.

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

15.5 Establish turf by vegetative methods

COURSE

Horticulture IV (8036)

15.5

PERFORMANCE OBJECTIVE

P15.5 Given a land area on which turf is to be established, the required quantity of sod, and the necessary tools and equipment, establish the turf by vegetative methods (sodding or plugging). All items on an instructor-prepared checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E15.5.1 Prepare the soil as for turf to be seeded.

E15.5.2 Determine the grass species and variety to be established.

E15.5.3 Determine the appropriate planting technique:

a. Sodding for cool season grasses:
   1. Lay sod strips with all edges in contact with adjoining strips.
   2. On sloping land, lay sod strips across contour and secure in soil with wire or wooden stakes.
   3. Roll sod to establish good root-to-soil contact.

b. Plugging for warm season grasses:
   1. Cut sod into 3-inch round or 3-to 6-inch square plugs.
   2. Open planting holes for the plugs, either round with a plug cutter, square with a spade, or as a furrow. Use spacing appropriate to grass type and plug size.
   3. Set plugs in planting holes, smooth loose soil around plug, and roll the plugs for good soil contact.

E15.5.4 Clean all tools and equipment used and return to storage area.

E15.5.5 Irrigate the new turf planting.

CRITERION-REFERENCED MEASURE

C15.5 Turf established by vegetative methods with all items on instructor-prepared checklist rated acceptable.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students research grass varieties (E15.5.2).
2. Arrange for students to visit a landscape site where turf is being installed (E15.5.1-E15.5.5).
3. Demonstrate the procedures to establish turf by sodding and plugging (E15.1.1-E15.5.5).

SELECTED TOOLS AND MATERIALS

Bluegrass, Bermuda, or Zoyia sod
Plug cutter (or bulb planter)
Roller
Handout: Instructor-prepared checklist

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Lawns and Ground Covers. Vocational Education Productions.

SELECTED REFERENCES

Ornamental Horticulture, pp. 426-429. McDaniel.
Turfgrass Maintenance Workers. V-TECS. Performance Objectives 35 and 67.

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

15.6 Transplant bare-root trees and shrubs

COURSE

Horticulture IV (8036)

15.6

PERFORMANCE OBJECTIVE

P15.6 Given necessary supplies and access to planting tools and equipment, transplant a bare-root tree or shrub. Roots must not be damaged or restricted from their natural spread, and when settled, the filled hole should be level with the contour of the surrounding soil.

SELECTED ENABLING OBJECTIVES

E15.6.1 Remove plant from packing material.

E15.6.2 Check for damaged roots. Remove broken roots.

E15.6.3 Dig hole 6 inches deeper and 6 inches wider than plant's root system.

E15.6.4 Place plant in hole to same depth as previously grown.

E15.6.5 Spread roots into natural growing position.

E15.6.6 Fill soil around roots and in hole.

E15.6.7 Tamp soil until firm.

E15.6.8 Water plant.

E15.6.9 After water has settled, fill hole with soil to level of surrounding soil surface, and construct watering basin.

E15.6.10 Wrap, stake, and prune, if necessary.

CRITERION-REFERENCED MEASURE

C15.6 Bare-root tree or shrub transplanted with roots undamaged and unrestricted from their natural spread. After settling, filled hole level with contour of surrounding soil.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate transplanting a bare-root tree or shrub (E15.6.1-E15.6.10).
2. Show and discuss transparency masters from Illustrated Horticulture (E15.6.3-E15.6.6).
3. Have students transplant a bare-root tree or shrub (E15.6.1-E15.6.10).

SELECTED TOOLS AND MATERIALS

Wheelbarrow
Shovel
Pruning shears
Water
Hoe
Stakes
Twine

SELECTED AUDIOVISUAL MATERIALS

Slides:	Transplanting, Guying, and Staking Landscape Plants. Ohio Curriculum Materials.
Transparencies:	"Planting and Maintenance," Illustrated Horticulture.

SELECTED REFERENCES

Grounds Maintenance Handbook, pp. 86-95. Conover.
Ornamental Horticulture, pp. 451-453. McDaniel.

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

15.7 Transplant balled and burlapped trees and shrubs

COURSE

Horticulture IV (8036)

15.7

PERFORMANCE OBJECTIVE

P15.7 Given a balled and burlapped tree or shrub and access to planting tools and equipment, transplant the tree or shrub. The plant should be set in well prepared soil, positioned properly, the root ball undamaged, and all girdling material removed.

SELECTED ENABLING OBJECTIVES

E15.7.1 Dig hole 6 inches deeper and 6 inches wider than the plant's root ball.

E15.7.2 Modify back-fill soil as necessary.

E15.7.3 Place plant in hole at the same depth as previously grown.

E15.7.4 Partially fill planting hole.

E15.7.5 Loosen burlap and fold back.

E15.7.6 Complete filling of hole and firm soil around root ball.

E15.7.7 Water plant thoroughly.

E15.7.8 After water has settled, fill the hole with soil to level of surrounding soil surface and construct a watering basin.

E15.7.9 Wrap, stake, and prune tree, if necessary.

CRITERION-REFERENCED MEASURE

C15.7 Balled and burlapped tree or shrub transplanted in well prepared soil, positioned properly, the root ball undamaged, and all girdling material removed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review task ball and burlap trees and shrubs--9.15 (E15.7.1-E15.7.4).
2. Outline procedure for transplanting a balled and burlapped tree or shrub (E15.7.1-E15.7.9).
3. Have students transplant a balled and burlapped tree or shrub (E15.7.1-E15.7.9).
4. Arrange for students to visit a site being landscaped and view transplanting of balled and burlapped trees or shrubs (E15.7.1-E15.7.9).

SELECTED TOOLS AND MATERIALS

Shovel
Wheelbarrow
Pruning shears
Water
Hoe
Stakes
Twine

SELECTED AUDIOVISUAL MATERIALS

Slides:	Balling and Burlapping Trees and Shrubs. Vocational Agriculture Service.
Transparencies:	"Planting and Maintenance," Illustrated Horticulture.

SELECTED REFERENCES

Grounds Maintenance Handbook, pp. 86-95. Conover.
Ornamental Horticulture, pp. 453-456. McDaniel.
Turfgrass Maintenance Workers. V-TECS. Performance Objective 37.

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

15.8 Transplant container trees and shrubs

COURSE

Horticulture IV (8036)

15.8

PERFORMANCE OBJECTIVE

P15.8 Given access to planting tools, equipment, and supplies, transplant a container tree or shrub. The soil must be prepared properly, the plant positioned properly, and the root system in good condition for growth.

SELECTED ENABLING OBJECTIVES

E15.8.1 Dig hole 6 inches deeper and 6 inches wider than the plant's root ball.

E15.8.2 Modify back-fill soil as necessary.

E15.8.3 Remove container.

E15.8.4 Inspect root ball for pot-bound condition.

E15.8.5 Place plant in hole at same depth as previously grown.

E15.8.6 Fill hole with soil and firm around root ball.

E15.8.7 Water plant thoroughly.

E15.8.8 After water has settled, fill the hole with soil to level of surrounding soil surface and construct a watering basin.

E15.8.9 Wrap, stake, and prune, if necessary.

CRITERION-REFERENCED MEASURE

C15.8 Container tree or shrub transplanted in properly prepared soil, positioned properly, with root system in good condition for growth.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide class with samples of pot-bound trees or shrubs and discuss proper methods of transplanting them (E15.8.4).
2. Demonstrate procedures for transplanting container trees and shrubs (15.8.1-E15.8.9).
3. Have students transplant a container tree or shrub (E15.8.1-E15.8.9).

SELECTED TOOLS AND MATERIALS

Shovel
Wheelbarrow
Pruning shears
Water
Hoe
Stakes
Twine

SELECTED AUDIOVISUAL MATERIALS

Slides: Balling and Burlapping Trees and Shrubs. Vocational Agriculture Services.

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 68.
Ornamental Horticulture, pp. 453-456. McDaniel.
Turfgrass Maintenance Workers. V-TECS. Performance Objective 37.

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

TASK / COMPETENCY

15.9 Brace newly planted trees

Application

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

15.9

PERFORMANCE OBJECTIVE

P15.9 Given planted trees, guy wires, rubber hose, stakes, tying materials, and sledge hammer, brace one newly planted tree that is more than 2 inches in diameter and one that is less than 2 inches in diameter. On the larger tree, the bracing must prevent leaning when 20-30 pounds of force is applied above the midpoint of the tree trunk. The guy wires must not damage the bark on the tree trunk or branches during windy periods. On the smaller tree, the stakes should not damage the bark. Bracing must prevent leaning when 10-20 pounds of force is applied halfway up the tree trunk.

SELECTED ENABLING OBJECTIVES

E15.9.1 Outline and demonstrate procedures for bracing newly planted trees which are 2 inches or less in diameter:

a. Determine the length of stake.
b. Cut stake to length.
c. Drive one stake 2 inches into ground 6 inches from tree trunk on windward side of tree. A second stake may be placed on opposite side, if necessary.
d. Wrap trunk, if appropriate.
e. Tie tree to stake(s) in three places with leather, rope, or other material which will not cut bark or tree. Trunk should stand straight.

E15.9.2 Outline and demonstrate procedure for bracing newly planted trees which are 2 inches or more in diameter:

a. Drive three short stakes into ground approximately 6 feet from base of tree. Stakes should be spaced equally around tree, the first located on the prevailing wind side, and driven at an angle toward the tree.
b. Tie tree to stakes with guy wire placed through rubber hose sections placed in a strong branch crotch midway up the tree.
c. Mark the guy wires with plastic flags or other material to improve visibility and safety.

CRITERION-REFERENCED MEASURE

C15.9 Newly planted trees braced. Tree over 2 inches in diameter braced so that bark on tree trunk and branches not damaged during windy periods, and when 20-30 pounds of force applied above midpoint of tree trunk, tree does not lean. Tree less than 2 inches in diameter braced so that stakes do not damage bark, and when 10-20 pounds of force applied halfway up tree trunk, tree does not lean.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss purposes and procedures for bracing or guying newly planted trees (E15.9.1, E15.9.2).

2. Have students practice bracing newly planted trees (E15.9.1, E15.9.2).

SELECTED TOOLS AND MATERIALS

Steel or wooden stakes--6 feet long for bracing, 1 foot long for guying
Guy wire or other tying material
Rubber hose
Sledge hammer

SELECTED AUDIOVISUAL MATERIALS

Slides: Transplanting, Guying and Staking Landscape Plants. Ohio Curriculum Materials.

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objectives 68 and 69.
Grounds Maintenance Handbook, pp. 90-92. Conover.
Ornamental Horticulture, pp. 459-460. McDaniel.

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

15.10 Plant annual flowers

COURSE

Horticulture IV (8036)

15.10

PERFORMANCE OBJECTIVE

P15.10 Given annual plants in containers, a planting area, water supply, and access to planting tools, plant annual flowers. The leaves, stems, and roots of the plants must not be damaged during the planting process. A visual inspection after 6 hours must show that plants have not wilted excessively.

SELECTED ENABLING OBJECTIVES

E15.10.1 List and state characteristics of common annual flowers.

E15.10.2 Check soil for proper moisture and mixture, using standard horticulture criteria.

E15.10.3 Dig hole to about twice width of root ball, slightly deeper than root ball.

E15.10.4 Remove each plant from container, if necessary.

E15.10.5 If root ball is compacted, pull root ends from ball without damage to root.

E15.10.6 Set plant into hole and fill in under root ball and around sides of root ball. Top root ball should be flush with contour of seedbed.

E15.10.7 Soak filled hole with water.

E15.10.8 Construct shading device to protect plant from hot sun.

CRITERION-REFERENCED MEASURE

C15.10 Annual flowers planted with no damage to leaves, stems, or roots. After 6 hours, visual inspection shows no excessive wilting of plants.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display illustrations or samples of various types of annual flowers (E15.10.1).
2. Demonstrate how to plant annual flowers (E15.10.1-E15.10.8).
3. Have students plant annual flowers (E15.10.1-E15.10.8).
4. Have students plant perennial flowers or transplant perennial divisions, explaining the similarities to annual plant handling (E15.10.1-E15.10.8).

SELECTED TOOLS AND MATERIALS

- Annual plants
- Water
- Hoe
- Shovel
- Shading device

SELECTED AUDIOVISUAL MATERIALS

Transparencies: "Planting and Maintenance," Illustrated Horticulture.

SELECTED REFERENCES

The Complete Book of Growing Plants From Seed, pp. 74-77. Haring.

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

15.11 Plant bulbs and related structures

COURSE

Horticulture IV (8036)

15.11

PERFORMANCE OBJECTIVE

P15.11 Given access to planting tools and supplies, plant bulbs and related structures 6 to 8 inches deep in a prepared bed. The bulbs must be completely covered with topsoil and set with pointed part up.

SELECTED ENABLING OBJECTIVES

E15.11.1 List names and characteristics of various kinds of flowers grown from bulbs.

E15.11.2 Identify bulbs to be planted.

E15.11.3 Outline planting instructions for bulbs.

E15.11.4 Remove bulb from package or bed, taking generous amount of soil with each bulb.

E15.11.5 Dig hole to proper depth for bulb being planted.

E15.11.6 Place bulb in hole with pointed part up.

E15.11.7 Add bone meal or other plant food as required.

E15.11.8 Fill hole, being sure bulb is not moved from upright position.

E15.11.9 Soak filled hole with water.

E15.11.10 Use various procedures to dig, dry, and divide bulbs prior to fall planting.

CRITERION-REFERENCED MEASURE

C15.11 Bulbs and related structures planted 6 to 8 inches deep in prepared bed; bulbs covered completely with topsoil and set with pointed part up.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display illustrations of different types of flowers grown from bulbs (E15.11.1).
2. Discuss characteristics of bulbs and provide students with planting depth guides for different types and sizes of bulbs (E15.11.2, E15.11.3).
3. Demonstrate how to plant bulbs (E15.11.4-E15.11.10).
4. Have students plant bulbs following supplier's instructions (E15.11.4-E15.11.9).
5. Explain and describe various methods used to dig, dry, and divide bulbs for transplanting (E15.11.10).
6. Discuss similarities and differences in handling and planting related structures, such as corms, tubers, and rhizomes (E15.11.10).

SELECTED TOOLS AND MATERIALS

Bone meal or other plant food
Bulbs
Bulb diggers
Shovel
Hoe
Rake
Prepared beds

SELECTED AUDIOVISUAL MATERIALS

Transparency: "Planting and Maintenance," Illustrated Horticulture.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 21.
Gardening-Groundskeeping. V-TECS. Performance Objective 54.
Nursery Production. V-TECS. Performance Objective 15.

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

15.12 Plan and draw small scale landscape designs

COURSE

Horticulture V (8038)

15.12

PERFORMANCE OBJECTIVE

P15.12 Given guidelines for small landscape designs, the necessary resources, and a designated area to be landscaped, plan and draw a small landscape design to scale. Design plan must be aesthetically pleasing, functional, and accurate in accordance with guidelines provided by the instructor.

SELECTED ENABLING OBJECTIVES

E15.12.1 Identify and state use of landscape design tools. Include: T-square, scale, 30-60 degrees triangle, 45 degrees triangle, french curve, templates, and compass.

E15.12.2 Identify common symbols used in landscape plans.

E15.12.3 Use an architect's scale and draw selected examples to the scales of 1/8" = 1" and 1/4" = 1".

E15.12.4 Identify 3 major areas of a residential landscape design.

E15.12.5 Relate principles of design to small landscapes.

E15.12.6 Identify 5-10 species for each of the following categories: large deciduous trees, large evergreens, small deciduous trees, deciduous shrubs, evergreen shrubs, ground covers, and vines.

CRITERION-REFERENCED MEASURE

C15.12 Small scale landscape designs planned and drawn to scale. Plan is aesthetically pleasing, functional, and accurate in accordance with instructor-prepared guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Identify and demonstrate use of drafting tools (E15.12.1).
2. Have students prepare a scale drawing of a house and landscape area (E15.12.2, E15.12.3).
3. Identify and provide examples of landscape design principles (E15.12.4, E15.12.5).
4. Have students prepare landscape plan for selected property and choose plant materials to be used (E15.12.5).
5. Invite a landscape architect to discuss landscape design with class (E15.12.4-E15.12.6).

SELECTED TOOLS AND MATERIALS

Drafting equipment
Handout: Instructor-provided guidelines

SELECTED AUDIOVISUAL MATERIALS

Slides:	Landscape Design. Ohio Curriculum Materials.
Transparencies:	"Landscape Design," Illustrated Horticulture.

SELECTED REFERENCES

Identifying Plant Symbols Used in Landscape Design. Learning Activity Package. Virginia Department of Education.
Landscaping, 2nd ed., Unit 1, pp. 4-6. Ingles.

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

15.13 Plan and draw interior landscapes

COURSE

Horticulture V (8038)

15.13

PERFORMANCE OBJECTIVE

P15.13 Given a home or commercial setting, the necessary resources and guidelines on interior landscape designs, and the necessary supplies and equipment, plan and draw an interior landscape design to scale. Design plan must be aesthetically pleasing, functional, and accurate according to guidelines provided by the instructor.

SELECTED ENABLING OBJECTIVES

E15.13.1 Identify and state use of landscape design tools.

E15.13.2 Identify common symbols used in landscape plans.

E15.13.3 Using an architect's scale, draw selected examples to the scales of 1/8" = 1" and 1/4" = 1".

E15.13.4 Identify design elements for: plantings, enclosures, surfaced areas, and garden embellishment.

E15.13.5 Relate principles of design to interior landscape design.

E15.13.6 Identify 5-10 species for each of the following interior plant categories: low light requiring, medium light requiring, high light requiring, tree-like, shrub-like, ground cover, fine texture, medium texture, and coarse texture.

CRITERION-REFERENCED MEASURE

C15.13 Interior landscape design planned and drawn to scale; plan is aesthetically pleasing, functional, and accurate in accordance with instructor-provided guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Identify and demonstrate use of drafting tools (E15.13.1).
2. Have students prepare scale drawing of a house, office, or school interior suitable for an interior landscape design (E15.13.2, E15.13.3).
3. Identify and provide examples of design principles applicable to interior landscaping, including a field trip to a designated office or shopping mall, if possible (E15.13.4, E15.13.5).
4. Have students prepare interior landscape plan for selected site and choose plant materials to be used (E15.13.6).

SELECTED TOOLS AND MATERIALS

Drafting equipment
Handout: Instructor-prepared guidelines

SELECTED AUDIOVISUAL MATERIALS

Slides:	Landscape Design. Ohio Curriculum Materials.
Transparencies:	"Landscape Design," Illustrated Horticulture.

SELECTED REFERENCES

Identifying Plant Symbols Used in Landscape Design. Learning Activity Package. Virginia Department of Education.
Interior Decorating With Plants. Wallach.
Landscaping, 2nd ed., Sections 2-5. Ingles.
Ornamental Horticulture, pp. 238-242. McDaniel.

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

15.14 Install landscape according to plan

COURSE

Horticulture V (8038)

15.14

PERFORMANCE OBJECTIVE

P15.14 Given a small landscape plan, and the necessary tools, equipment, plants, and specifications, install the landscape. The installation must conform to the landscape plan specifications.

SELECTED ENABLING OBJECTIVES

E15.14.1 Identify common symbols used in landscape plans.

E15.14.2 Measure and mark locations of new plants.

E15.14.3 Plant the trees, shrubs, vines, and ground covers, using proper procedures.

E15.14.4 Establish the turf, if appropriate.

E15.14.5 Mulch the new plantings as specified in the plan.

E15.14.6 Remove all debris from the landscape site.

E15.14.7 Clean and store all tools and equipment.

CRITERION-REFERENCED MEASURE

C15.14 Landscape installed in accordance with plan specifications.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Identify symbols used to represent plants and structural materials in landscape planning (E15.14.1).
2. Demonstrate how to read and translate scale measurements on the plan to locations on the site (E15.14.2).
3. Have students prepare a scale model of the landscape plan each has prepared (E15.14.1-E15.14.7).
4. Visit a job site where landscaping is being installed (E15.14.1-E15.14.7).

SELECTED TOOLS AND MATERIALS

Stakes
String
Hammer
Hoe
Shovel
Mulch
Landscape plan

SELECTED AUDIOVISUAL MATERIALS

Slides:	Landscape Design. Ohio Curriculum Materials.
Transparencies:	"Landscape Design," Illustrated Horticulture.

SELECTED REFERENCES

Agricultural Lesson Plans: Implementing the Plan. Department of Agricultural Education and Mechanization.
Landscaping, Unit 2. Ingels.

DUTY AREA

15. ESTABLISHING LANDSCAPES AND TURF

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

15.15 Install interior landscape according to plan

COURSE

Horticulture V (8038)

15.15

PERFORMANCE OBJECTIVE

E15.15 Given an interior landscape plan, and the necessary materials, tools, equipment, plants, and specifications, install an interior landscape. The installation must conform to landscape plan specifications.

SELECTED ENABLING OBJECTIVES

E15.15.1 Identify common symbols used in landscaping.

E15.15.2 Measure and mark locations for plants.

E15.15.3 Plant container-grown plants.

E15.15.4 Remove all debris from the site.

E15.15.5 Clean and store all tools and equipment.

CRITERION-REFERENCED MEASURE

C15.15 Interior landscape installed according to plan specifications.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Identify the symbols used for interior landscape plans (E15.15.1).
2. Demonstrate how to read and translate scale measurements on the plan to locations in the design area (E15.15.2.)
3. Have students, on a rotational basis, change the design for an interior display planter at the school (E15.15.1-E15.15.5).
4. Visit a shopping mall or other location with a large scale interior landscape to review procedures for implementing the plan (E15.15.1-E15.15.5).

SELECTED TOOLS AND MATERIALS

Stakes
String
Hammer
Hoe
Shovel
Mulch
Interior landscape plan

SELECTED AUDIOVISUAL MATERIALS

Slides:	Landscape Design. Ohio Curriculum Materials.
Transparencies:	"Landscape Design," Illustrated Horticulture.

SELECTED REFERENCES

Ornamental Horticulture, pp. 240-249. McDaniel.
Interior Decorating with Plants. Wallach.

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

TASKS/COMPETENCIES

16.1 Mow lawns
16.2 Trim lawns
16.3 Mow golf greens
16.4 Select appropriate sprinkler heads and irrigate turf
16.5 Fertilize and lime turf
16.6 Aerate turf
16.7 Dethatch turf
16.8 Overseed turf
16.9 Repair worn turf areas
16.10 Fill in holes or depressions in turf
16.11 List ways erosion can be prevented or remedied
16.12 Clean grounds of leaves and litter
16.13 Fertilize plant beds
16.14 Fertilize shrubs
16.15 Fertilize trees by the "punch bar" method
16.16 Water landscape plants
16.17 Mulch plants and plantings
16.18 Weed landscape beds
16.19 Remove grass from landscape bed edges
16.20 Prune trees and shrubs
16.21 Train (espalier) plants
16.22 Winterize plants and trees
16.23 Protect new plants from direct sunlight
16.24 Remove dead or unwanted trees
16.25 Maintain interior landscape
16.26 Develop fertilization schedule

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

16.1 Mow lawns

COURSE

Horticulture IV (8036)

16.1

PERFORMANCE OBJECTIVE

P16.1 Given a grass lawn area, a rotary or reel-type mower, and operating instructions, mow the lawn within the confines of the area. The grass height should be within ± 1/4 inch of the recommendations of the state extension service for cutting grass on the lawn area. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E16.1.1 List state extension service recommendations for mowing designated lawn area and grass type.

E16.1.2 Service and prepare mower for mowing.

E16.1.3 Identify mower safety procedures.

E16.1.4 Identify proper mowing directions.

E16.1.5 Collect and dispose of clippings as instructed.

E16.1.6 Clean mower blades after completion of the job.

CRITERION-REFERENCED MEASURE

C16.1 Lawns mowed to within ± 1/4 inch of the recommendations of the state extension service for cutting grass on the lawn area.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with a list of guidelines for mowing lawn or other turf areas. Discuss proper mowing directions and grass blade lengths (E16.1.1).
2. Demonstrate and have students service, operate, and maintain various types of rotary or reel-type mowers (E16.1.2).
3. Explain and emphasize all safety precautions (E16.1.3).
4. Have students mow lawn or other turf areas (E16.1.1-E16.1.6).

SELECTED TOOLS AND MATERIALS

Rotary and/or reel mower(s)
Small engine tools
Gasoline
Safety glasses
Operator's manual

SELECTED AUDIOVISUAL MATERIALS

Filmstrip:	Lawns and Groundcovers. Vocational Education Productions.
Slides:	For Safety's Sake. Outdoor Power Equipment Institute.

SELECTED REFERENCES

Lawnmower Safety, Publication 52. Virginia Cooperative Extension Service.
Ornamental Horticulture, pp. 433-435. McDaniel.
Small Engines, Volume 1. AAVIM.
Turfgrass Guide, Publication 311. Virginia Cooperative Extension Service.
Turf Management Handbook, pp. 77, 132, 143-151, 200. Sprague.
Turfgrass Maintenance Works. V-TECS. Performance Objective 61.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

16.2 Trim lawns

COURSE

Horticulture IV (8036)

16.2

PERFORMANCE OBJECTIVE

P16.2 Given a mowed lawn area and a power trimmer, trim lawns by edging the grass which overlaps a sidewalk and trimming all other grass missed during mowing. The grass should be edged even with the sidewalk border, and all other grass should be trimmed to the same height as the mowed grass without scalping, angled cutting, or injury to other plants or damage to the machine. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E16.2.1 Perform machine maintenance as specified.

E16.2.2 Operate power trimmer safely.

E16.2.3 Edge sidewalk by holding trimmer head in a vertical position at the proper height for the cord length (if electric) and walking slowly.

E16.2.4 Trim tall grass around trees and borders by holding trimmer head in a horizontal position and making a careful sweeping motion, keeping head level and far enough away from the plants to prevent damage.

E16.2.5 Clean and store trimmer after use.

CRITERION-REFERENCED MEASURE

C16.2 Lawns trimmed with grass edged even with sidewalk border, and all other grass trimmed to same height as the mowed grass without scalping, angled cutting, or injury to other plants or damage to the machine; all safety procedures observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students perform maintenance on power trimmer (E16.2.1).
2. Review safety precautions in using power trimmer (E16.2.2).
3. Demonstrate how to operate a power trimmer, either gasoline or electric-powered, emphasizing the necessary safety precautions (E16.2.1-E16.2.5).
4. Have students edge and trim grass with a rotary-cord trimmer (E16.2.1-E16.2.5).

SELECTED TOOLS AND MATERIALS

Power trimmer
Safety glasses
Extension cord or gasoline
Operator's manual for equipment

SELECTED AUDIOVISUAL MATERIALS

Slides: For Safety's Sake. Outdoor Power Equipment Institute.

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 115.

—— Application ——

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

16.3 Mow golf greens

COURSE

Horticulture IV (8036)

16.3

PERFORMANCE OBJECTIVE

P16.3 Given an unmowed golf course green and a mower, mow greens. All items on instructor's checklist must be rated acceptable, and all safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E16.3.1 Perform service checks on mower.

E16.3.2 Operate mower safely.

E16.3.3 Transport mowers to greens area and, approaching the green from the rear, drive mower on to green.

E16.3.4 Repair ball marks.

E16.3.5 Remove flagstick.

E16.3.6 Clean mower and mower blades.

E16.3.7 Return mower to proper place in storage area.

CRITERION-REFERENCED MEASURE

C16.3 Golf course greens mowed with all items on instructor's checklist rated acceptable, and all safety procedures observed.

INSTRUCTOR'S CHECKLIST 16.3

DUTY: MAINTAINING TURF, GREENS, AND LANDSCAPES

TASK: Mow Golf Greens

ACTIVITY: Mow greens

ITEM	RATING*	
	Acceptable	Unacceptable
1. Oil and fuel levels of engine checked.		
2. Set screws on cutting assembly checked to ensure correct cutting level as prescribed by instructor.		
3. Flagstick removed.		
4. Mowing done in straight lines.		
5. Outer edge of green ringed.		
6. Flagstick replaced.		
7. Mower and mower blades cleaned after all mowing completed.		
8. All safety precautions observed.		

*All items must receive acceptable rating.

Source: Turfgrass Maintenance Workers. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate how to service, operate, and maintain a mower (E16.3.1-E16.3.7).
2. Demonstrate how to prepare a golf green for mowing (E16.3.4, E16.3.5).
3. Show and discuss slides Lawn Mower Safety (E16.3.2).
4. Have students mow greens in accordance with guidelines set forth in checklist (E16.3.1-E16.3.7).

SELECTED TOOLS AND MATERIALS

Mower
Operator's manual
Small engine tools
Gasoline
Safety glasses
Handout: Instructor's checklist

SELECTED AUDIOVISUAL MATERIALS

Slides: Lawn Mower Safety. Virginia Cooperative Extension Service.

SELECTED REFERENCES

Lawn Mower Safety, Publication 52. Virginia Cooperative Extension Service.
Small Engines, Volume 1. AAVIM.
Turfgrass Maintenance Workers. V-TECS. Performance Objective 1.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

16.4 Select appropriate sprinkler heads and irrigate turf

COURSE

Horticulture IV (8036)

16.4

PERFORMANCE OBJECTIVE

P16.4 Given a designated area where sprinklers are to be attached and allowed to run for a specified amount of time, and a functioning irrigation system, select appropriate sprinkler heads and irrigate the turf. All water outlets must be located and coupled, and all selected sprinklers must deliver a sufficient supply of water to cover the entire area for the specified amount of time.

SELECTED ENABLING OBJECTIVES

E16.4.1 Identify sprinkler heads designated for use on area.

E16.4.2 Locate water outlets or receptacles for attaching sprinklers.

E16.4.3 Connect sprinklers to outlets.

E16.4.4 Allow sprinkler to operate for designated period of time to deliver the required amount of water.

E16.4.5 Turn off water and uncouple sprinklers at end of alloted time.

E16.4.6 Store sprinklers appropriately when not in use.

CRITERION-REFERENCED MEASURE

C16.4 Appropriate sprinkler heads selected and turf irrigated, all water outlets located and coupled, and all selected sprinklers deliver sufficient supply of water to cover entire area for the specified time.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students discuss the need for irrigating turf (E16.4.1-E16.4.6).
2. Have students select sprinkler heads and locate water outlets or receptacles and connect sprinklers (E16.4.1-E16.4.3).
3. Have students irrigate turf (E16.4.1-E16.4.6).

SELECTED TOOLS AND MATERIALS

Irrigation system
Tools to connect sprinklers
Water supply

SELECTED AUDIOVISUAL MATERIALS

Transparencies: "Water Supply," Illustrated Horticulture.

SELECTED REFERENCES

Best Management Practices for Horticulture, p. 8, Publication 390-410. Virginia Cooperative Extension Service.
Ornamental Horticulture, pp. 429-430. McDaniel.
Planning for an Irrigation System. AAVIM.
Turf Management Handbook, pp. 151-155. Sprague.
Turfgrass Maintenance Workers, p. 18. V-TECS. Performance Objective 7.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

TASK / COMPETENCY

16.5 Apply fertilizer and lime

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

16.5

PERFORMANCE OBJECTIVE

P16.5 Given an area to be fertilized, recommended amounts of fertilizer and lime per acre, a spreader, and a specified granular fertilizer, apply the fertilizer and lime. Fertilizer and lime must be uniformly applied at ± 10% within the rate per acre as specified by the instructor.

SELECTED ENABLING OBJECTIVES

E16.5.1 Select appropriate types of fertilizer and lime.

E16.5.2 Service equipment as required.

E16.5.3 Calibrate spreader to apply the specified amount of fertilizer and/or lime per acre or per 1,000 square feet of area.

E16.5.4 Apply fertilizer in straight lines, moving in the configuration of the area with consideration of wind direction.

E16.5.5 Apply lime in straight lines, moving in the configuration of the area with consideration of wind direction.

E16.5.6 Clean fertilizer and lime spreaders immediately following use.

E16.5.7 Return spreaders and extra materials to designated storage area.

CRITERION-REFERENCED MEASURE

C16.5 Fertilizer and lime applied to turf uniformly and ± 10% within the rate per acre specified by instructor.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss differences in fertilizer materials used for turf (E16.5.1).
2. Discuss factors affecting fertilizing times of selected turf types (E16.5.1).
3. Have students list and discuss various methods of fertilizing and liming turf (E16.5.1-E16.5.7).
4. Demonstrate how to use a fertilizer and a lime spreader (E16.5.1-E16.5.7).
5. Have students apply lime and fertilizer as needed to designated turf areas (E16.5.1-E16.5.7).

SELECTED TOOLS AND MATERIALS

Fertilizer
Lime
Fertilizer spreader
Lime spreader
Soil test report
Operator's manuals

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Best Management Practices for Horticulture, pp. 7-8, Publication 390-410. Virginia Cooperative Extension Service.
Ornamental Horticulture, pp. 430-433. McDaniel.
Spray Formulation. Learning Activity Packet. Virginia Department of Education.
Turfgrass Guide, Publication 311. Virginia Cooperative Extension Service.
Turf Management Handbook, Chapters 3 and 4. Sprague.
Turfgrass Maintenance Workers, pp. 11, 20. V-TECS. Performance Objective 8.

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

TASK/COMPETENCY

16.6 Aerate turf

Application

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

16.6

PERFORMANCE OBJECTIVE

P16.6 Given a properly mowed turf grass area needing aerafication, a hydraulic coring machine, grooving machine, slicer, or other suitable implement, aerate the soil as effectively as possible considering the capability of machine used and in accordance with instructor's guidelines. All items on an instructor-prepared checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E16.6.1 List guidelines for effective aeration of turf.

E16.6.2 Service an aerating machine.

E16.6.3 Check oil, gas, and lubrication levels in the machine periodically as aerafication continues.

E16.6.4 Remove debris from turf.

E16.6.5 Clean aerafier and return all equipment to storage.

CRITERION-REFERENCED MEASURE

C16.6 Turf aerated as effectively as possible considering capability of machine used; all items on instructor-prepared checklist rated acceptable.

SELECTED INSTRUCTIONAL ACTIVITIES

1. List and discuss guidelines for effective aeration of turf (E16.6.1).
2. Have students demonstrate how to adjust an aerating machine (E16.6.1, E16.6.2).
3. Have students participate in the procedures of checking oil, gas, and lubrication levels in an aerating machine (E16.6.4).
4. Have students aerate turf (E16.6.1-E16.6.6).

SELECTED TOOLS AND MATERIALS

Aerating machine
Mowed turf grass area
Rake
Wheelbarrow
Operator's manual
Handout: Instructor-prepared checklist

SELECTED AUDIOVISUAL MATERIALS

Slides: Lawn Renovation and Reestablishment. Ohio Curriculum Materials.

SELECTED REFERENCES

Grounds Keeping Equipment, Volume 1. AAVIM.
Grounds Maintenance Handbook, pp. 49-51. Conover.
Ornamental Horticulture, pp. 436-437. McDaniel.
Turfgrass Maintenance Workers. V-TECS. Performance Objective 20.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

16.7 Dethatch turf

COURSE

Horticulture IV (8036)

16.7

PERFORMANCE OBJECTIVE

16.7 Given a suitable machine and a designated turf area needing thatch removed, dethatch the turf. Dethatching should be done to a depth of 2 inches and in two different directions (the second at right angles to the first) with thatch accumulations completely broken up and destroyed. After dethatching, the entire area must be raked to remove any debris. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

16.7.1 Service thatching unit.

16.7.2 Dethatch from one direction at the depth indicated and then in another at right angles to the first.

16.7.3 Remove debris from turf.

16.7.4 Clean thatching machine and return to storage.

CRITERION-REFERENCED MEASURE

C16.7 Turf dethatched to a depth of 2 inches and in two different directions (second at right angles to first). Thatch accumulations completely broken up and destroyed, and all debris removed from area. All safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate how to service, operate, and maintain a thatching machine (E16.7.1-E16.7.4).
2. Have students dethatch a turf area (E16.7.1-E16.7.4).
3. Emphasize importance of raking and removing debris from lawn area (E16.7.3).

SELECTED TOOLS AND MATERIALS

Thatching machine
Turf area needing dethatching
Rake
Wheelbarrow
Pictures or catalogs depicting thatchers
Operator's manual

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Grounds Keeping Equipment, Volume 1. AAVIM.
Turfgrass Maintenance Workers. V-TECS. Performance Objective 21.
Turfgrass Science and Culture, Chapter 16. Beard.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

16.8 Overseed turf

COURSE

Horticulture IV (8036)

16.8

PERFORMANCE OBJECTIVE

16.8 Given a golf course or large grounds area, the required seed, and a cyclone or gravity seeder, overseed the turf according to specifications. All items on instructor's checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

16.8.1 Thatch the area in at least two directions.

16.8.2 Remove debris remaining from thatching.

16.8.3 Apply topdressing at proper rate uniformly and evenly over the entire area to be overseeded.

16.8.4 Distribute seed at proper rate uniformly over the area by means of either a cyclone or drop seeder.

16.8.5 Return tools, equipment, and unused materials to storage.

CRITERION-REFERENCED MEASURE

16.8 Turf overseeded with all items on instructor's checklist rated acceptable.

INSTRUCTOR'S CHECKLIST 16.8

DUTY: MAINTAINING TURF, GREENS, AND LANDSCAPES

TASK: Overseed Turf

ACTIVITY: Overseed turf

ITEM	RATING*	
	Acceptable	Unacceptable
1. Seed bed had been well prepared prior to the time of overseeding and was in good condition.		
2. Seeder was properly calibrated and operated to insure the specified rate of seeding.		
3. Seed was distributed uniformly and evenly over the entire area designated for seeding.		
4. Prescribed fertilizers were applied as prescribed.		
5. Area was properly irrigated after job was completed.		
6. Left-over seed and fertilizer, if any, was properly stored when job was completed.		
7. All tools and equipment were properly cleaned and stored following use.		

*All items must receive acceptable rating.

Source: Turfgrass Maintenance Workers. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review work on dethatching (E16.8.1, E16.8.2).
2. Show and discuss slides Lawn Renovation and Reestablishment (E16.8.3, E16.8.4).
3. Outline and demonstrate procedures for overseeding turf areas (E16.8.1-E16.8.5).

SELECTED TOOLS AND MATERIALS

Cyclone seeder or gravity seeder
Grass seed
Operator's manual
Handout: Instructor's checklist

SELECTED AUDIOVISUAL MATERIALS

Slide: Lawn Renovation and Reestablishment. Ohio Curriculum Materials.

SELECTED REFERENCES

Selecting Plant Seed. Learning Activity Package. Virginia Department of Education.
Turfgrass Maintenance Workers. V-TECS. Performance Objective 28.

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

TASK / COMPETENCY

16.9 Repair worn turf areas

Application

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

16.9

PERFORMANCE OBJECTIVE

P16.9 Given an area of damaged turf to be reestablished and necessary supplies, tools, and equipment, repair worn turf areas by removing the damaged sod and reseeding or resodding the area. All items on the instructor's checklist must be rated as acceptable, and all safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E16.9.1 Describe methods used to repair worn turf areas.

E16.9.2 Disk, till, or spade old turf as conditions require.

E16.9.3 Level land preparatory to seeding or sodding.

E16.9.4 Apply fertilizers according to soil test requirements and mix the soil.

E16.9.5 Seed or lay sod.

E16.9.6 Roll area following seeding or sodding to ensure good soil contact.

E16.9.7 Clean implements and return to storage.

E16.9.8 Irrigate and fertilize area when job is completed and as often as necessary thereafter until turf is well established.

CRITERION-REFERENCED MEASURE

C16.9 Worn turf areas repaired with all items on instructor's checklist rated acceptable, and all safety precautions observed.

INSTRUCTOR'S CHECKLIST 16.9a

DUTY: MAINTAINING TURF, GREENS, AND LANDSCAPES

TASK: Repair Worn Turf Areas

ACTIVITY: Repair worn turf areas, using the seeding method

ITEM	RATING*	
	Acceptable	Unacceptable
1. Tools and equipment chosen for breaking out old sod properly selected and efficiently operated.		
2. Equipment chosen for leveling land suitable and effectively used.		
3. Designated fertilizers carefully measured and well mixed into topsoil prior to the seeding operations.		
4. Seed uniformly distributed over the entire land area.		
5. Seedbed firmed with a roller to ensure good contact between seed and soil.		
6. Seeded area irrigated as soon as possible and repeated as often as required to ensure turf establishment.		
7. Supplemental applications of plant food applied until turf established at the desired levels of density and quality.		
8. All tools and equipment properly cleaned and returned to storage.		

*All items must receive acceptable rating.

Source: Turfgrass Maintenance Workers. V-TECS.

INSTRUCTOR'S CHECKLIST 16.9b

DUTY: MAINTAINING TURF, GREENS, AND LANDSCAPES

TASK: Repair Worn Turf Area

ACTIVITY: Repair worn turf areas, using the solid sodding method

ITEM	RATING*	
	Acceptable	Unacceptable
1. Suitable tools and equipment selected for leveling the land and preparing the soil.		
2. Fertilizer carefully selected and thoroughly mixed into the soil prior to laying the sod.		
3. Sod carefully laid joint to joint over the entire area to be sodded.		
4. The laid sod rolled sufficiently to ensure tightness of turf prior to the first irrigation.		
5. The first irrigation applied as soon as the sod laid and rolled.		
6. Irrigations repeated every 5-10 days or as frequently as necessary to ensure knitting of roots and establishment of a good turf.		
7. Small amounts of fertilizers applied as necessary preceeding irrigations and sod rolled following irrigations to ensure establishment of a smooth, even, and dense high-quality turf.		
8. All tools and equipment cleaned and dried following use and returned to the storage area.		

*All items must receive acceptable rating.

Source: Turfgrass Maintenance Workers. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students demonstrate competency in use of tractor, disc, plow, or other equipment needed to repair or revitalize worn or damaged turf areas (E16.9.2, E16.9.3).
2. Outline and demonstrate procedures for repairing worn lawn or turf areas (E16.9.1-E16.9.8).
3. Review and discuss all safety procedures (E16.9.2-E16.9.7).

SELECTED TOOLS AND MATERIALS

Soil test results
Tractor and disk
Other suitable equipment
Roller
Handouts: Instructor's checklist

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 98.
Turfgrass Guide, Publication 311. Virginia Cooperative Extension Service.
Turfgrass Maintenance Workers. V-TECS. Performance Objectives 34 and 35.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

16.10 Fill in holes or depressions in turf

COURSE

Horticulture IV (8036)

16.10

PERFORMANCE OBJECTIVE

16.10 Given the necessary tools and topsoil, fill all holes and depressions in turf. The topsoil applied to each depression must match the contour of the area when packed.

SELECTED ENABLING OBJECTIVES

E16.10.1 Load wheelbarrow with topsoil.

E16.10.2 Locate holes or depressions in lawn.

E16.10.3 Mark all holes and depressions.

E16.10.4 Rake top soil to match contour of area.

CRITERION-REFERENCED MEASURE

C16.10 Holes or depression in turf filled and topsoil matches contour of area when packed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Outline and demonstrate procedure for filling in holes and depressions in a lawn area with topsoil (E16.10.1-E16.10.4).
2. Have students fill in holes or depressions in a lawn area (E16.10.1-E16.10.4).

SELECTED TOOLS AND MATERIALS

Topsoil
Rake
Wheelbarrow

SELECTED AUDIOVISUAL MATERIALS

Slides: Lawn Renovation and Reestablishment. Ohio Curriculum Materials.

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 50.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

16.11 List ways erosion can be prevented or remedied

COURSE

Horticulture IV (8036)

16.11

PERFORMANCE OBJECTIVE

P16.11 Given a description or shown areas eroded by water and by wind, list a minimum of 10 ways that erosion can be prevented or remedied with 100% accuracy.

SELECTED ENABLING OBJECTIVES

E16.11.1 Describe types of soil erosion damage that can be caused by water.

E16.11.2 Identify ways that a soil area eroded by water can be controlled or remedied.

E16.11.3 Describe types of erosion damage that can be caused by wind.

E16.11.4 Explain ways to control or remedy soil erosion by wind.

CRITERION-REFERENCED MEASURE

C16.11 Ten ways to prevent or remedy erosion listed with 100% accuracy.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Show slides or pictures depicting eroded soil areas (E16.11.1, E16.11.2).

2. Discuss ways that a soil area eroded by water and/or wind can be controlled or remedied (E16.11.2-E16.11.4).

3. Discuss the following soil erosion control methods (E16.11.1-E16.11.4):
   a. Soil erosion caused by water:
      1. plant cover crops
      2. rotate cover crops
      3. construct terraces
      4. construct artificial barriers
      5. sod waterways
      6. construct cross-drainage ways.

   b. Soil erosion caused by wind:
      1. sod areas
      2. furrow soil
      3. rotate cover crops
      4. mulch area
      5. plant tree or shrub windbreak
      6. construct specialized fencing
      7. plant strip covers.

SELECTED TOOLS AND MATERIALS

None identified

SELECTED AUDIOVISUAL MATERIALS

Slides:	Control of Water Erosion and Sediment Pollution. Ohio Curriculum Materials.
Transparencies:	"Water Supply," Illustrated Horticulture.

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objectives 77 and 78.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

16.12 Clean grounds of leaves and litter

COURSE

Horticulture IV (8036)

16.12

PERFORMANCE OBJECTIVE

P16.12 Given a lawn area littered with leaves and paper and the necessary tools, clean grounds of all leaves and litter in accordance with guidelines provided by instructor.

SELECTED ENABLING OBJECTIVES

E16.12.1 Remove paper and other synthetic debris and deposit in container.

E16.12.2 Sweep leaves and remaining debris into small piles using a leaf broom.

E16.12.3 Place piled leaves into disposable bags or other suitable containers.

E16.12.4 Remove containers to appropriate locations.

CRITERION-REFERENCED MEASURE

C16.12 Grounds cleaned of all leaves and litter in accordance with guidelines provided by instructor.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss procedure for removing litter (E16.12.1).
2. Outline methods for sweeping leaves and debris (E16.12.2-E16.12.4).
3. Review and explain guidelines (E16.12.1-E16.12.4).

SELECTED TOOLS AND MATERIALS

Container for debris
Rake
Broom
Handout: Instructor's guidelines

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Approved Practices in Beautifying the Home Grounds, p. 101. Hoover.
Gardening-Groundskeeping. V-TECS. Performance Objective 89.
Turfgrass Maintenance Workers. V-TECS. Performance Objective 49.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

16.13 Fertilize plant beds

COURSE

Horticulture IV (8036)

16.13

PERFORMANCE OBJECTIVE

P16.13 Given an established bed of herbaceous plants, fertilizer, and the necessary equipment, fertilize the plant bed. The fertilizer must be broadcast uniformly over the bed and incorporated into the soil surface.

SELECTED ENABLING OBJECTIVES

E16.13.1 Determine the type and amount of fertilizer needed for the bed area.

E16.13.2 Broadcast the fertilizer uniformly over the entire bed.

E16.13.3 Scratch fertilizer into the surface of exposed soil.

E16.13.4 Irrigate the bed to wash fertilizer off the plants and to dissolve fertilizer into the soil.

CRITERION-REFERENCED MEASURE

C16.13 Plant beds fertilized with fertilizer broadcast uniformly over the bed and incorporated into the soil surface.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review types and effects of fertilizers (E16.13.1).
2. Have students identify type and amount of fertilizer needed for a designated planting bed (E16.13.2).
3. Review procedures for applying granular fertilizers (E16.13.2-E16.13.4).
4. Have students apply fertilizer (E16.13.1-E16.13.4).
5. Have students irrigate fertilized planting beds (E16.13.4).

SELECTED TOOLS AND MATERIALS

Fertilizer
Rake
Water source
Soil test report

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Greenhouse Operation and Management, 2nd ed., Chapter 8. Nelson.
Herbaceous Ornamental Plants. Ohio Curriculum Materials.

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

16.14 Fertilize shrubs

COURSE

Horticulture IV (8036)

16.14

PERFORMANCE OBJECTIVE

P16.14 Given an established shrub in need of fertilization, fertilizer, and the necessary equipment, fertilize the shrub. Fertilizer must be broadcast uniformly over the root area and incorporated into the soil surface.

SELECTED ENABLING OBJECTIVES

E16.14.1 Determine the amount of fertilizer needed based on shrub size.

E16.14.2 Broadcast fertilizer uniformly over the root area of the shrub, but not within 6 inches of the crown.

E16.14.3 Scratch the fertilizer into the top inch of the soil surface.

E16.14.4 Irrigate shrubs thoroughly to wash fertilizer off foliage and to dissolve fertilizer into soil.

CRITERION-REFERENCED MEASURE

C16.14 Shrub fertilized with fertilizer broadcast uniformly over the root area and incorporated into the soil surface.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review types and uses of fertilizers (E16.14.1-E16.14.4).
2. Outline and demonstrate procedure for applying fertilizer to established shrubs (E16.14.1-E16.14.4).
3. Have students apply fertilizer to shrubs and irrigate shrubs after fertilizer is applied (E16.14.1-E16.14.4).

SELECTED TOOLS AND MATERIALS

Fertilizer
Water source
Rake
Soil test report

SELECTED AUDIOVISUAL MATERIALS

Transparencies: "Fertilizer and pH," Illustrated Horticulture.

SELECTED REFERENCES

Ornamental Horticulture, pp. 465-467. McDaniel.
Fertilizing and Mulching Shrubs and Trees, Publication 456. Virginia Cooperative Extension Service.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

16.15 Fertilize trees by the "punch bar" method

COURSE

Horticulture IV (8036)

16.15

PERFORMANCE OBJECTIVE

P16.15 Given an established tree (3 to 8 inches in diameter) with a shoot growth rate of less than 8 to 12 inches per season, fertilizer, and the necessary equipment, fertilize the tree with mild fertilizer using the "punch bar" method. The fertilizer must be applied equally to root areas throughout and 2 feet beyond the drip line of the tree.

SELECTED ENABLING OBJECTIVES

E16.15.1 Describe the "punch bar method" and list its advantages.

E16.15.2 Punch holes 12 inches apart and 6-12 inches deep within a circle extending 2 feet outside drip line of tree.

E16.15.3 Determine the total amount of fertilizer needed.

E16.15.4 Determine approximate amount of fertilizer required for each hole.

E16.15.5 Equally distribute fertilizer in each hole.

E16.15.6 Irrigate holes thoroughly.

E16.15.7 Cap each hole with soil.

CRITERION-REFERENCED MEASURE

C16.15 Tree fertilized by "punch bar" method. Fertilizer applied equally throughout root areas and 2 feet beyond drip line of tree.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students describe and discuss the "punch bar" method of fertilizing trees (E16.15.1).
2. Demonstrate the "punch bar" method of fertilizing trees. Emphasize importance of thorough irrigation (E16.15.1-E16.15.7).
3. Have students fertilize shrubs using the "punch bar" method (E16.15.1-E16.15.7).
4. Discuss alternative tree fertilization techniques, such as trunk injection, soluble fertilizers injected into soil, and regular lawn fertilization (E16.15.1).

SELECTED TOOLS AND MATERIALS

Fertilizer
Auger
Rake
Source of water
Soil test report

SELECTED AUDIOVISUAL MATERIALS

Slides/Cassettes:	Reasons for Fertilizing Urban Trees and Shrubs. National Arbonist Association. Available from Department of Horticulture, VPI & SU. Tools and Techniques of Fertilizing Urban Trees and Shrubs. National Arbonist Association. Available from Department of Horticulture, VPI & SU.
Transparencies:	"Planting and Maintenance," Illustrated Horticulture.

SELECTED REFERENCES

50 Laboratory Exercises for Vocational Ornamental Horticulture, pp. 45-46. Hemp.
Introductory Horticulture, p. 342. Reiley and Shry.
Ornamental Horticulture, pp. 465-467. McDaniel.

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

16.16 Water landscape plants

COURSE

Horticulture IV (8036)

16.16

PERFORMANCE OBJECTIVE

P16.16 Given a group of landscape plants and irrigation equipment, water landscape plants. All items on instructor's checklist must be rated as acceptable.

SELECTED ENABLING OBJECTIVES

E16.16.1 Explain ways to determine amount of moisture needed by landscape plants.

E16.16.2 Determine the moisture content of the soil.

E16.16.3 Determine soil type and slope.

E16.16.4 Determine if plants are established or newly planted.

E16.16.5 Determine amount of water needed by plants.

E16.16.6 Check equipment for proper working order.

E16.16.7 Explain reasons for early morning watering.

E16.16.8 Set up watering equipment for proper coverage.

E16.16.9 Turn on water and check for runoff.

E16.16.10 Regulate water flow.

E16.16.11 Check area frequently to maintain amount of water.

CRITERION-REFERENCED MEASURE

C16.16 Landscape plants watered with all items on instructor's checklist rated as acceptable.

INSTRUCTOR'S CHECKLIST 16.16

DUTY: MAINTAINING TURF, GREENS, AND LANDSCAPES

TASK: Water Landscape Plants

ACTIVITY: Water landscape plants

ITEM	RATING*	
	Acceptable	Unacceptable
1. Plants watered only if necessary.		
2. Water applied around plants at rate of absorption of soil.		
3. Moisture pentetrated in soil around plants 6 to 8 inches.		
4. Plants watered in early morning.		

*All items must receive acceptable rating.

Source: Gardening-Groundskeeping. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students determine the effects of different watering intervals on plants growing in different media (E16.16.1).

2. Explain and discuss guidelines for determining proper amount of water needed by landscape plants (E16.16.1-E16.16.5).

3. Outline and demonstrate procedures for watering landscape plants. Discuss reasons for early morning watering (E16.16.1-E16.16.11).

4. Have students water landscape plants as needed (E16.16.1-E16.16.11).

SELECTED TOOLS AND MATERIALS

Water source
Handout: Instructor's checklist

SELECTED AUDIOVISUAL MATERIALS

Transparencies: "Planting and Maintenance," "Water Supply," Illustrated Horticulture.

SELECTED REFERENCES

50 Laboratory Exercises for Vocational Ornamental Horticulture Students, pp. 97-99. Hemp.
Gardening-Groundskeeping, p. 102. V-TECS.
Grounds Maintenance Handbook, pp. 70-72,92-93. Conover.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

16.17 Mulch plants and plantings

COURSE

Horticulture IV (8036)

16.17

PERFORMANCE OBJECTIVE

P16.17 Given landscape beds and individual trees and shrubs, bark, or other mulching material, mulch the plants. The mulch must be uniformly 2 to 4 inches deep over the entire area and extend out from the individual plants a distance appropriate for the type of plant, per instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E16.17.1 List and describe various types of mulches.

E16.17.2 State purpose of mulching materials.

E16.17.3 Prepare soil for mulch, if required.

E16.17.4 Add excess mulch to allow for settling.

E16.17.5 Smooth top of mulch, if necessary.

CRITERION-REFERENCED MEASURE

C16.17 Plants or plantings mulched to a depth of 2 to 4 inches over the entire area and extending out from individual plants a distance appropriate for the type of plant per instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss types and uses of mulches (E16.17.1, E16.17.2).
2. Demonstrate how to add mulch (E16.17.1-E16.17.5).
3. Have students add mulching materials to a bed of seedlings or around other new plantings (E16.17.1-E16.17.5).
4. Have students check mulch condition around previously mulched landscaped plants and in plant beds and replenish the mulch as necessary (E16.17.3-E16.17.5).

SELECTED TOOLS AND MATERIALS

Mulching materials
Handout: Instructor's guidelines

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Fertilizing and Mulching Shrubs and Trees, Publication 456. Virginia Cooperative Extension Service.
Gardening-Groundskeeping. V-TECS. Performance Objective 40.
Grounds Maintenance Handbook, pp. 69-70. Conover.
Nursery Production. V-TECS. Performance Objective 37.

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

16.18 Weed landscape beds

COURSE

Horticulture IV (8036)

16.18

PERFORMANCE OBJECTIVE

P16.18 Given an unmulched landscape bed and the necessary tools or equipment, weed the landscape bed. None of the plants must be damaged in the weeding process, and 95% or more of all visible weeds must be removed.

SELECTED ENABLING OBJECTIVES

E16.18.1 Identify weeds or grasses that need to be removed from flower beds.

E16.18.2 Determine hardness of soil. If soil is hard, soften with sprinkled water.

E16.18.3 Take shallow, short strokes with hoe to uproot weeds and grass.

E16.18.4 Rake weeds and grass to edge of bed.

E16.18.5 Remove weeds and grass by hand, if necessary.

E16.18.6 Dispose of weeds.

E16.18.7 Add new soil, if needed.

E16.18.8 Smooth surface of bed.

CRITERION-REFERENCED MEASURE

C16.18 Landscape beds weeded with no damage to plants and with 95% or more of all visible weeds removed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Devise flashcards or assemble slides of various common weeds and plants, and have students identify weeds (E16.18.1).
2. Have students practice effective use of a hoe to remove most weeds and grasses (E16.18.4).
3. Have students remove weeds from landscape beds (E16.18.1-E16.18.8).

SELECTED TOOLS AND MATERIALS

Hoe
Rake

SELECTED AUDIOVISUAL MATERIALS

Slides: Identification Characteristics of 70 Crop and Weed Plants. Ohio Curriculum Materials.

SELECTED REFERENCES

Approved Practices in Beautifying the Home Grounds, pp. 111-119. Hoover.
Gardening-Groundskeeping. V-TECS. Performance Objective 49.
Nursery Production. V-TECS. Performance Objective 44.
Plant Science, pp. 239-243. Hartman and others.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

TASK / COMPETENCY

16.19 Remove grass from landscape bed edge

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

16.19

PERFORMANCE OBJECTIVE

C16.19 Given landscape beds and the necessary tools, remove grass from landscape bed edge. Permanent plants and shrubs must not be damaged, and the edge line must be within ± 1 inch of the original line.

SELECTED ENABLING OBJECTIVES

E16.19.1 Stretch string along landscape bed edge approximately 1 inch above ground level.

E16.19.2 Make vertical cuts with spade along edge, following line of string.

E16.19.3 Dispose of grass and remove string.

CRITERION-REFERENCED MEASURE

C16.19 Grass removed from landscape bed edges with no damage to permanent plants and shrubs and with the edge line with ± 1 inch of original line.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students stretch string along flower bed edge approximately 1 inch above ground level (E16.19.1).
2. Have students make vertical cuts along the edge following the line of the strings (E16.19.2).
3. Have students properly dispose of grass and remove string (E16.19.3).

SELECTED TOOLS AND MATERIALS

Stakes and string
Spade

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 49.

— Application —

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

16.20 Prune trees and shrubs

COURSE

Horticulture IV (8036)

16.20

PERFORMANCE OBJECTIVE

P16.20 Given at least two trees and two shrubs needing to be pruned, pruning shears, pruning paint, saws, and other necessary equipment, prune each tree and shrub according to its particular needs. All items on the instructor's checklist must be rated acceptable, and all safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E16.20.1 Identify tools and select correct tool for each particular cut.

E16.20.2 Inspect tools and/or equipment to determine if they are in working condition.

E16.20.3 Remove all dead, diseased, or injured wood.

E16.20.4 Remove wayward branches.

E16.20.5 Lower or raise crown of tree, using pruning techniques.

E16.20.6 Shape tree.

E16.20.7 Thin crown.

E16.20.8 Seal all large cuts with antiseptic compound.

CRITERION-REFERENCED MEASURE

C16.20 Trees and shrubs pruned correctly in accordance with instructor's checklist. All items in checklist rated as acceptable, and all safety precautions observed.

INSTRUCTOR'S CHECKLIST 16.20

DUTY: MAINTAINING TURF, GREENS, AND LANDSCAPES

TASK: Prune Trees and Shrubs

ACTIVITY: Prune trees and shrubs

ITEM	RATING*	
	Acceptable	Unacceptable
1. Tools selected and used for pruning each tree and shrub suitable.		
2. All dead and damaged branches removed.		
3. A sufficient number of live limbs and branches removed to permit an adequate amount of sunlight to penetrate the foliage and give the tree or shrub a desirable shape, appearance, and aesthetic balance.		
4. Limbs and branches cut out selected with care.		
5. Tools properly used and cared for in such a way as not to dull their cutting edges unnecessarily or damage the trees and shrubs being pruned.		
6. Sufficient care taken to avoid bruising limbs and branches and pruning paint applied to surfaces where large limbs severed.		
7. Tools cleaned and returned to their proper place when.		

*All items must receive acceptable rating.

Source: Gardening-Groundskeeping. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss reasons for pruning and pruning principles and techniques (E16.20.1-E16.20.8).
2. Display an assortment of pruning tools and demonstrate appropriate uses for each tool (E16.20.1, E16.20.2).
3. Demonstrate how to prune a variety of trees and shrubs. Include single-stemmed shrubs, multiple-stemmed shrubs, hedges, and small ornamental trees (E16.20.1-E16.20.8).
4. Have students prune trees and shrubs (E16.20.1-E16.20.8).
5. Emphasize importance of applying tree paint or other antiseptic compound to pruning wounds greater than 1" in diameter (E16.20.8).
6. Demonstrate how to use a power chipper, if available (E16.20.1-E16.20.4).

SELECTED TOOLS AND MATERIALS

Pruning shears
Pruning saw
Pruning paint
Handout: Instructor's checkist

SELECTED AUDIOVISUAL MATERIALS

Film:	Pruning Practices at the Brooklyn Botanical Garden. Brooklyn Botanical Garden.
Filmstrip/Cassette:	Elements of Pruning. Vocational Education Productions.
Slides:	Objectives of Pruning Deciduous Trees. Vocational Agriculture Services.
Transparencies:	"Planting and Maintenance," Illustrated Horticulture.

SELECTED REFERENCES

50 Laboratory Exercises for Vocational Ornamental Horticulture Students, pp. 47-52. Hemp.
Gardening-Groundskeeping. V-TECS. Performance Objectives 59-63, and 45.
Pruning Large Tree Limbs Using the "3-Cut Method". Learning Activity Package. Virginia Department of Education.
The Pruning Manual. Christopher.
Turfgrass Maintenance Workers. V-TECS. Performance Objective 38.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

16.21 Train (espalier) plants

COURSE

Horticulture IV (8036)

16.21

PERFORMANCE OBJECTIVE

P16.21 Given a plant that trains easily, necessary equipment, and aids for espaliers, train (espalier) the plant for a specified purpose or shape. All growth on one side should be eliminated and copper wire layout should match predetermined purpose or shape. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E16.21.1 List types of plants suitable for esparliering.

E16.21.2 Determine ultimate size and form of plant.

E16.21.3 Construct frame of desired design or lay out design on background of structure.

E16.21.4 Drive masonry nails periodically along design, if appropriate.

E16.21.5 Tightly string copper wire on nails and twist around each nail.

E16.21.6 Prune all growth from one side of plant.

E16.21.7 Place flat side against wall. Any side branches which may be bent to follow design should be retained.

E16.21.8 Tie all branches to wire along design previously laid out.

CRITERION-REFERENCED MEASURE

C16.21 Plant trained for a specified purpose or shape with all growth on one side eliminated; copper wire layout matches predetermined purpose or shape, and all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. List types of plants suitable for esparliering. Show samples or illustrations of trained plants (E16.21.1).
2. Conduct a field trip to see examples of espaliering (E16.21.1, E16.21.2).
3. Demonstrate how to train plants and shrubs (E16.21.1-E16.21.8).

SELECTED TOOLS AND MATERIALS

Copper wire
Plant trellis
Masonry nails
Pruning shears

SELECTED AUDIOVISUAL MATERIALS

Slides:	Herbaceous Ornamental Plants. Ohio Curriculum Materials.
Transparencies:	"Planting and Maintenance," Illustrated Horticulture.

SELECTED REFERENCES

50 Laboratory Exercises for Vocational Ornamental Horticulture Students, pp. 55-57. Hemp.
Gardening-Groundskeeping. V-TECS. Performance Objective 58.
The Pruning Manual, pp. 120-123. Christopher.

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

16.22 Winterize plants and trees

COURSE

Horticulture V (8038)

16.22

PERFORMANCE OBJECTIVE

P16.22 Given access to tools, materials, and supplies, a thin barked tree, and plants, winterize plants and trees. Cap the plants and wrap the tree for protection from frost or winter weather. All bark on the tree trunk area as high as 5 feet from the ground or up to the lower limbs should be covered completely. Each cap should cover the plant completely without any contact with leaf or stem surface.

SELECTED ENABLING OBJECTIVES

E16.22.1 Identify types of trees that should be winterized.

E16.22.2 List proper winterizing techniques for a variety of plants.

E16.22.3 Demonstrate how to cap plants.

E15.22.4 Demonstrate how to protect trees or shrubs from winter weather:
  a. Begin at top of tree trunk and wrap downward in a spiral form. If burlap is used, fold edges under.
  b. After wrapping is completed, take string and wrap in opposite direction and tie to hold wrapping in place.

CRITERION-REFERENCED MEASURE

C16.22 Plants and trees winterized. Bark on tree trunk from ground up to 5 feet or up to lower limbs wrapped completely. Plants capped completely without any contact with leaf or stem surface.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Show slides or pictures of types of trees and shrubs that should be protected from winter weather (E16.22.1).
2. Demonstrate wrapping and capping to protect trees and plants from winter weather (E16.22.3-E16.22.4).
3. Discuss anti-transpirants, soil mulching for roses, sheltered sites in the landscapes, and avoidance of frost pockets (E16.22.2).

SELECTED TOOLS AND MATERIALS

Wrapping materials

SELECTED AUDIOVISUAL MATERIALS

Slides: Winterizing Your Trees and Shrubs. Virginia Cooperative Extension Service.

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objectives 55-57.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

TASK / COMPETENCY

16.23 Protect new plants from direct sunlight

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture V (8038)

16.23

PERFORMANCE OBJECTIVE

P16.23 Given access to tools, materials, and supplies, protect new plants from direct sunlight by constructing portable shading devices. Plants should not wilt as a result of too much sunlight once devices are in place. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E16.23.1 Explain the need to shade new plants.

E16.23.2 Outline procedures for constructing portable devices to shade plants.

E16.23.3 Identify all safety precautions.

CRITERION-REFERENCED MEASURE

C16.23 New plants protected from direct sunlight by construction of portable shading devices; plants not wilted and all safety procedures followed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss the effects of direct sunlight on new plants (E16.23.1).
2. Review and emphasize all safety procedures (E16.23.3).
3. Have students construct portable shading devices (E16.23.1-E16.23.3).

SELECTED TOOLS AND MATERIALS

Portable shading devices

SELECTED AUDIOVISUAL MATERIALS

Slides: Environmental Injuries to Landscape Plants. Ohio Curriculum Materials.

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 34.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

16.24 Remove dead or unwanted trees

COURSE

Horticulture V (8038)

16.24

PERFORMANCE OBJECTIVE

P16.24 Given a tree 6 inches or less in diameter, a shovel, axe, chains, jack, or other necessary tools, remove dead or unwanted trees. No portion of the trunk should remain in the ground. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E16.24.1 Remove soil from around tree or stump.

E16.24.2 Cut tap roots and large fibrous roots.

E16.24.3 Place chains around stump or base of tree.

E16.24.4 Place parallel timbers on both sides of stump or base of tree.

E16.24.5 Place third timber across timbers 1 and 2 and as close to base as possible.

E16.24.6 Place jack on third timber and secure jack to chains.

E16.24.7 Lift out stump or tree using jack as hoist.

CRITERION-REFERENCED MEASURE

C16.24 Dead or unwanted trees removed with no portion of the trunk remaining in the ground, and with all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Describe and demonstrate all procedures to remove dead or unwanted trees (E16.24.1-E16.24.7).
2. Have students practice removing dead or unwanted trees (E16.24.1-E16.24.7).
3. Arrange for students to watch a professional tree removal service remove trees (E16.24.1-E16.24.7).

SELECTED TOOLS AND MATERIALS

Chains
Jack
Shovel
Axe

SELECTED AUDIOVISUAL MATERIALS

Slides/Cassette: Tree Removal Techniques. National Arbonist Association.

SELECTED REFERENCES

Grounds Maintenance Handbook, pp. 120-121. Conover.
Turfgrass Maintenance Workers. V-TECS. Performance Objective 39.

Application

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

16.25 Maintain interior landscape

COURSE

Horticulture V (8038)

16.25

PERFORMANCE OBJECTIVE

P16.25 Given a maintenance schedule, an interior planting area, and the necessary tools, supplies, and equipment, maintain an interior landscape for one month. All items on an instructor-prepared checklist must be completed satisfactorily.

SELECTED ENABLING OBJECTIVES

E16.25.1 State cultural requirements of designated foliage plants.

E16.25.2 Identify different watering methods for interior plants and demonstrate "drench then dry," "evenly moist," and "slightly moist" techniques.

E16.25.3 Identify common foliage plant diseases and pests and state accepted control methods.

CRITERION-REFERENCED MEASURE

C16.25 Interior landscaped maintained for one month with all items on instructor-prepared checklist completed satisfactorily.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students visit an interior planting area and explain the cultural requirements, and different watering methods. Identify common foliage plant diseases and pests (E16.25.1-E16.25.3).
2. Have students maintain an interior landscape located on the school grounds (E16.25.1-E16.25.3).

SELECTED TOOLS AND MATERIALS

Designated horticulture equipment and supplies
Handout: Instructor-prepared checklist

SELECTED AUDIOVISUAL MATERIALS

Slides: Plant Identification--Annuals, Perennials, and House Plants. Vocational Education Productions.

SELECTED REFERENCES

The Ball Red Book, 12th ed. Ball.
Landscaping, 2nd ed., Unit 3. Ingels.
Maintaining the Landscape. Task Sheets. Ohio Curriculum Materials.
Ornamental Horticulture, pp. 219-244. McDaniel.

DUTY AREA

16. MAINTAINING TURF, GREENS, AND LANDSCAPES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

16.26 Develop fertilization schedule

COURSE

Horticulture V (8038)

16.26

PERFORMANCE OBJECTIVE

P16.26 Given a description of a landscaped area, a soil analysis report, and schedule form, develop a schedule for applying fetilizer to shrubs, trees, and lawns during a one-year period. The schedule will be checked for accuracy by the instructor, using description of the landscape area, the soil analysis report, and fertilizer application reports from the state agricultural agencies.

SELECTED ENABLING OBJECTIVES

E16.26.1 Analyze description of landscaped area.

E16.26.2 Read soil analysis report.

E16.26.3 Refer to state agricultural agency reports for analysis of various fertilizers and recommended rates of application.

E16.26.4 List each type of shrub, tree, and lawn area on prepared schedule form.

E16.26.5 Identify type of fertilizer and rate of application for each shrub, tree, and lawn area.

E16.26.6 Indicate approximate dates for fertilizing each shrub, tree, and lawn area.

CRITERION-REFERENCED MEASURE

C16.26 A one year fertilization schedule for shrubs, trees, and lawns in a landscaped area developed. Schedule acknowledged as accurate by instructor based on description of landscape area, soil analysis report, and fertilizer application reports from state agricultural agencies.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with various sample copies of soil analysis reports, and have them identify aspects of each report (E16.26.2).
2. Have students review state agricultural agency reports on various fertilizers and rates of application and discuss (E16.26.3).
3. Have students develop a fertilization schedule for their home landscapes or the school campus based on soil tests they have taken and a survey of plants in the landscape (E16.26.1-E16.26.6).

SELECTED TOOLS AND MATERIALS

Soil analysis reports
Fertilizer application reports

SELECTED AUDIOVISUAL MATERIALS

Transparencies: "Fertilizer and pH" Illustrated Horticulture.

SELECTED REFERENCES

Gardening and Groundskeeping. V-TECS. Performance Objective 5.
Greenhouse Operation and Management, 2nd ed., Chapter 8. Nelson.

DUTY AREA

17. CONSTRUCTING AND MAINTAINING LANDSCAPE AND GREENS FACILITIES

TASKS/COMPETENCIES

17.1 Construct a plant-holding fan trellis

17.2 Construct fences

17.3 Construct ornamental stone walls

17.4 Install edging for planting beds

17.5 Construct raised planting bed

17.6 Clean ornamental pools

17.7 Relocate cups on golf course

17.8 Repair potholes in an asphalt street or parking lot

17.9 Repair concrete driveways

17.10 Sweep parking areas

17.11 Remove snow from sidewalks and driveways

17.12 Spread salt on icy sidewalks and driveways

17.13 Construct walls, walks, and other landscape structures

—— Application ——

DUTY AREA

17. CONSTRUCTING AND MAINTAINING LANDSCAPES AND GREENS FACILITIES

TASK / COMPETENCY

17.1 Construct a plant-holding fan trellis

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

17.1

PERFORMANCE OBJECTIVE

17.1 Given the necessary tools and supplies, construct a plant-holding fan trellis for a climbing plant. The completed work must be sturdy and symmetrical, and must blend with the surrounding architecture and landscape. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E17.1.1 List types and uses of trellises.

E17.1.2 Prepare site as necessary.

E17.1.3 Install a 3 foot post leaving 12 inches exposed.

E17.1.4 Cut thin trellis ribs from 2 inch stock of appropriate length.

E17.1.5 Secure ribs of trellis with bolts or waterproof glue and clamp within 6 inches of one end.

E17.1.6 Spread opposite ends of ribs into fan shape, space evenly, and secure to a horizontal rib.

E17.1.7 Secure trellis to post.

CRITERION-REFERENCED MEASURE

C17.1 Plant-holding trellis is sturdy, symmetrical, and blends with surrounding architecture and landscape; all safety procedures observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display samples or illustrations of trellises (E17.1.1).
2. Arrange for students to tour community to note various types of trellises. Have students identify advantages and disadvantages of the trellises they see (E17.1.1-E17.1.7).
3. Have students construct a fan shaped trellis (E17.1.1-E17.1.7).

SELECTED TOOLS AND MATERIALS

Trellis plan
Post
Posthole digger
Shovel
Bolts

Waterproof glue
Clamps
Rule or tape
Hammer
Lumber

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Approved Practices in Beautifying the Home Grounds, 4th ed., pp. 230-233. Hoover.
How to Build Orchard and Vineyard Trellises. Vocational Resources.

Application

DUTY AREA

17. CONSTRUCTING AND MAINTAINING LANDSCAPES AND GREENS FACILITIES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

17.2 Construct fences

COURSE

Horticulture IV (8036)

17.2

PERFORMANCE OBJECTIVE

P17.2 Given specifications and the necessary tools and materials, construct a fence. Posts must be plumb, all wires must be secure and without crimps, and all work must conform to manufacturer's or instructor's specifications. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E17.2.1 List and describe various types of fences.

E17.2.2 Lay out fence with string.

E17.2.3 Position and dig postholes.

E17.2.4 Set posts and braces in straight line.

E17.2.5 Pour concrete around posts and let set for five days.

E17.2.6 Attach fence stringer(s) as appropriate.

E17.2.7 Build fence panels according to desired fence design.

CRITERION-REFERENCED MEASURE

C17.2 Fence constructed with all posts plumb, all wires secure and without crimps, and all work conforming to manufacturer's or instructor's specifications; all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students bring to class pictures and photographs of various types of fences. Have class discuss the advantages and disadvantages of each type (E17.2.1).
2. Have students list purposes for building fences (E17.2.1).
3. Demonstrate the procedure for constructing fences (E17.2.2-E17.2.7).

SELECTED TOOLS AND MATERIALS

Posthole digger
Shovel
Concrete mixture or sacrete
Fence
Rule or tape
Specifications
Portable cement mixer or mortar box
Tamp
String
Level

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Building Fences. AAVIM.
Gardening-Groundskeeping. V-TECS. Performance Objective 93.
Landscape Design, pp. 115-119. Hannebaum.
Mechanics in Agriculture, 2nd ed., pp. 699-708. Phipps.

DUTY AREA

17. CONSTRUCTING AND MAINTAINING LANDSCAPES AND GREENS FACILITIES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

17.3 Construct ornamental stone walls

COURSE

Horticulture IV (8036)

17.3

PERFORMANCE OBJECTIVE

P17.3 Given masonry tools and equipment and supplies, construct an ornamental stone wall. The completed stone wall must not be spotted or marked by mortar, and the structure must rest securely in place. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E17.3.1 Lay out footing, using batter boards and string.

E17.3.2 Dig trench for footing to desired depth.

E17.3.3 Set footing level stakes.

E17.3.4 Pour concrete in trench to desired footing level.

E17.3.5 Assemble masonry materials.

E17.3.6 Mix mortar.

E17.3.7 Apply mortar to stones and joints with trowel and set in place.

E17.3.8 Smooth mortar joints with mortar joint tool.

E17.3.9 Clean stones with water-muriatic acid solution.

CRITERION-REFERENCED MEASURE

C17.3 Ornamental stone wall constructed and rests securely in place; wall is not spotted or marked by mortar, and all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Invite masonry teacher or a bricklayer to give class a demonstration of the use of masonry tools and materials (E17.3.1-E17.3.9).
2. Have students practice basic bricklaying techniques (E17.3.1-E17.3.9).
3. Have students participate in group project to construct an ornamental stone wall (E17.3.1-E17.3.9).
4. Emphasize all safety precautions associated with power mixers, muriatic acid, and other equipment and supplies (E17.3.1-E17.3.9).

SELECTED TOOLS AND MATERIALS

Masonry tools and supplies
Batter boards
Shovel
Concrete mixture or sacrete
Portable cement mixer or mortar box

SELECTED AUDIOVISUAL MATERIALS

Transparencies: Stone Masonry, Group VI. Hobar.

SELECTED REFERENCES

Brick, Concrete, Stonework. Vocational Resources.
Gardening-Groundskeeping. V-TECS. Performance Objective 104.
Landscaping, 2nd ed., pp. 185-186. Ingles.
Masonry Simplified, 3rd ed. Vocational Resources.
Mechanics in Agriculture, 2nd ed., pp. 601-645. Phipps.

DUTY AREA

17. CONSTRUCTING AND MAINTAINING LANDSCAPES AND GREENS FACILITIES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

17.4 Install edging for planting beds

COURSE

Horticulture IV (8036)

17.4

PERFORMANCE OBJECTIVE

P17.4 Given a flower bed to be edged, edging, and the necessary tools and equipment, install an edging for planting beds in accordance with instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E17.4.1 Identify materials that can be used for edging.

E17.4.2 List advantages and disadvantages of various edging materials.

CRITERION-REFERENCED MEASURE

C17.4 Edgings for planting beds installed in accordance with instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display edging materials and discuss each (E17.4.1).
2. Have students install edging for a flower bed (E17.4.1, E17.4.2).

SELECTED TOOLS AND MATERIALS

Edging materials
Shovels
Rakes
Handout: Instructor's guidelines

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Landscape Design, pp. 219-222. Hannebaum.

DUTY AREA

17. CONSTRUCTING AND MAINTAINING LANDSCAPES AND GREENS FACILITIES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

17.5 Construct raised planting bed

COURSE

Horticulture IV (8036)

17.5

PERFORMANCE OBJECTIVE

P17.5 Given specifications, landscape timbers, topsoil, and the necessary tools and equipment, construct a raised planting bed. Work must be attractive, functional, and accurate in accordance with instructor's specifications. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E17.5.1 Describe the advantages of a raised-bed planting.

E17.5.2 Demonstrate safe use of a hand and/or chain saw.

E17.5.3 Demonstrate use of level and measuring tape.

CRITERION-REFERENCED MEASURE

C17.5 Raised planting bed is attractive, functional, and accurate in accordance with instructor's specifications, and all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students practice handling and reading a level (E17.5.3).
2. Tour facilities with raised planting beds (E17.5.1).
3. Demonstrate how to construct raised planting beds (E17.5.1-E17.5.3).
4. Have students construct raised planting beds as part of their supervised occupational experience programs (E17.5.1-E17.5.3).

SELECTED TOOLS AND MATERIALS

Hammer
Hand or chain saw
Landscape timbers
Level
Measuring tape
Pick-mattox
20p or larger spikes
Shovel
Handout: Instructor's specifications

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Landscaping, 2nd ed., Unit 17. Ingels.

Application

DUTY AREA

17. CONSTRUCTING AND MAINTAINING LANDSCAPES AND GREENS FACILITIES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

17.6 Clean ornamental pools

COURSE

Horticulture IV (8036)

17.6

PERFORMANCE OBJECTIVE

P17.6 Given access to cleaning tools and supplies, clean an ornamental pool. The fresh water placed in the pool must not develop a surface film, and no debris must be visible on the pool bottom. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E17.6.1 Identify all safety precautions.

E17.6.2 Drain water from pool.

E17.6.3 Remove gravel or granite from base of pool and place on screen wire, if applicable.

E17.6.4 Spray gravel or granite with hydrochloric acid solution, using hose proportioner and water supply, and flush gravel or granite with water.

E17.6.5 Clean pool recesses, drain, and superstructure as necessary, using water-detergent solution.

E17.6.6 Place gravel or granite back into pool and spread evenly over base, if applicable.

E17.6.7 Fill pool with water.

CRITERION-REFERENCED MEASURE

C17.6 Ornamental pool cleaned and the fresh water placed in pool has no surface film, there is no debris visible on pool bottom, and all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. List and explain safety precautions necessary when handling pool cleaning chemicals and equipment (E17.6.1).
2. Have students clean an ornamental pool, following procedures provided by the instructor (E17.6.1-E17.6.6).

SELECTED TOOLS AND MATERIALS

Rubber gloves
Hydrocloric acid
Detergent
Screen wire frame
Water

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objectives 91 and 97.
Approved Practices in Beautifying the Home Grounds, pp. 238-241. Hoover.

Application

DUTY AREA

17. CONSTRUCTING AND MAINTAINING LANDSCAPES AND GREENS FACILITIES

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

17.7 Relocate cups on golf course

COURSE

Horticulture IV (8036)

17.7

PERFORMANCE OBJECTIVE

P17.7 Given a golf green requiring relocation of a cup, specifications, and the necessary tools, relocate the cup. Old hole must be plugged with turf from new hole, leaving a smooth, even, and level surface. The cup in new hold must make a level plane with the green surface with its lip 1/4" below ground level.

SELECTED ENABLING OBJECTIVES

E17.7.1 Use cup cutter to cut new holes.

E17.7.2 Use cup puller to remove cup.

E17.7.3 Plug old hole using turf from new hole, leaving a smooth, even, and level surface.

E17.7.4 Place new hole in such a way that it makes a level plane with the green surface.

CRITERION-REFERENCED MEASURE

C17.7 Cup on golf course relocated according to specifications with new cut lip 1/4" below ground level.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Outline procedure for relocating cups on a golf course (E17.7.1-E17.7.4).
2. Arrange for students to visit local golf course and view cup relocation (E17.7.1-E17.7.4).
3. Have students relocate cups on golf course as needed (E17.7.1-E17.7.4).

SELECTED TOOLS AND MATERIALS

Cup cutter
Cup puller

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Turfgrass Maintenance Workers. V-TECS. Performance Objective 4.

Application

DUTY AREA

17. CONSTRUCTING AND MAINTAINING LANDSCAPES AND GREENS FACILITIES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

17.8 Repair potholes in an asphalt street or parking lot

COURSE

Horticulture IV (8036)

17.8

PERFORMANCE OBJECTIVE

P17.8 Given a shovel, tamp, equipment, and cold- or hot-mix asphalt, repair a pothole in an asphalt street or parking lot. The asphalt must be contoured slightly higher than the roadway and compacted so that it will support an automobile.

SELECTED ENABLING OBJECTIVES

E17.8.1 Locate sunken areas or potholes.

E17.8.2 Remove broken asphalt and other faulty base material from roadbed.

E17.8.3 Compact to within 8 inches of roadway surface.

E17.8.4 Pour ready-mix concrete within 2 inches of roadway surface and let set for three days.

E17.8.5 Pour ready-mix hot- or cold-mix asphalt over concrete.

E17.8.6 Compact and smooth asphalt with a contour slightly higher than the roadway.

CRITERION-REFERENCED MEASURE

C17.8 Pothole repaired with asphalt contoured slightly higher than roadway and compacted so that it supports an automobile.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss materials used to repair streets and parking lots (E17.8.1-E17.8.6).
2. Demonstrate how to make repairs with asphalt (E17.8.1-E17.8.6).
3. Have students repair street with asphalt (E17.8.1-E17.8.6).

SELECTED TOOLS AND MATERIALS

Shovel
Tamp
Cold- or hot-mix asphalt
Wheelbarrow

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 103.
Walks, Walls and Fences. Vocational Resources.

Application

DUTY AREA

17. CONSTRUCTING AND MAINTAINING LANDSCAPES AND GREENS FACILITIES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

17.9 Repair concrete driveways

COURSE

Horticulture IV (8036)

17.9

PERFORMANCE OBJECTIVE

P17.9 Given tools, equipment, forming materials, and ready-mix concrete, repair a driveway at the street entrance. The completed driveway must provide for a smooth entrance and an adequate width to accommodate vehicular traffic. Except for slope to entrance, the thickness of the concrete must not be less than 4 inches.

SELECTED ENABLING OBJECTIVES

E17.9.1 Break up and remove old concrete from sidewalk and curb, if necessary.

E17.9.2 Remove loose dirt from base of driveway, if necessary.

E17.9.3 Construct forms, if necessary, so that new section will blend with street, curb, and old portion of driveway.

E17.9.4 Pour ready-mix concrete.

E17.9.5 Screen off and level new concrete, leaving a gentle slope for entrance.

E17.9.6 Rough-finish concrete, using heavy-bristle broom.

E17.9.7 Let concrete set for three of four days and remove forms.

CRITERION-REFERENCED MEASURE

C17.9 Repaired concrete driveway provides for smooth entrance and is of adequate width to accommodate vehicular traffic; concrete not less than 4 inches thick except for slope to entrance.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss materials used to repair driveways (E17.9.1-E17.9.7).
2. Demonstrate how to repair driveways with concrete (E17.9.1-E17.9.7).
3. Have students repair driveways with concrete (E17.9.1-E17.9.7).

SELECTED TOOLS AND MATERIALS

Shovel
Tamp
Wheelbarrow
Ready-mix concrete

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Brick, Concrete, Stonework. Vocational Resources.

Application

DUTY AREA

17. CONSTRUCTING AND MAINTAINING LANDSCAPES AND GREENS FACILITIES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

17.10 Sweep parking areas

COURSE

Horticulture IV (8036)

17.10

PERFORMANCE OBJECTIVE

P17.10 Given an industrial sweeping machine and operator's manual, and a designated parking lot, sweep a parking area clean. Equipment must be operated in accordance with operator's manual, and area must be left clean. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E17.10.1 Check manual for operating instructions.

E17.10.2 Adjust sweeping brooms for streets, curbs, and corners.

E17.10.3 Start brooms in motion.

E17.10.4 Move machine to curb side of parking lot.

E17.10.5 Observe mirror on machine and gauge side broom for sweeping along curb.

E17.10.6 Turn on water sprayer to prevent excessive dust.

E17.10.7 Lift broom from pavements when stopping machine.

CRITERION-REFERENCED MEASURE

C17.10 Parking area swept clean and equipment operated in accordance with operator's manual, with all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Arrange for students to tour a facility where an industrial sweeping machine is operated (E17.10.1-E17.10.7).
2. Demonstrate now to operate an industrial sweeping machine (E17.10.1-E17.10.7).
3. Have students operate an industrial sweeping machine (E17.10.1-E17.10.7).

SELECTED TOOLS AND MATERIALS

Industrial sweeping machine
Operator's manual

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 105.
Groundskeeping Equipment, Volume 1. AAVIM.

DUTY AREA

17. CONSTRUCTING AND MAINTAINING LANDSCAPES AND GREENS FACILITIES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

17.11 Remove snow from sidewalks and driveways

COURSE

Horticulture IV (8036)

17.11

PERFORMANCE OBJECTIVE

P17.11 Given snow shovel, snow blower, or tractor with snow blade, remove snow from a sidewalk or driveway. Snow is not to be piled on plantings or in an area which can block pedestrian or vehicular traffic. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E17.11.1 Demonstrate how to operate snow removal equipment.

E17.11.2 List and follow safety precautions.

CRITERION-REFERENCED MEASURE

C17.11 Snow removed from sidewalk or driveway and is not piled on plantings or in an area that blocks pedestrian or vehicular traffic; all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate how to remove snow from sidewalks and driveways (E17.11.1, E17.11.2).
2. Have students remove snow from sidewalks and driveways (E17.11.1, E1711.2).
3. Emphasize all safety precautions (E17.11.2).

SELECTED TOOLS AND MATERIALS

Snow removal equipment
Shovel

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Groundskeeping Equipment, Volume 1. AAVIM.
Snowthrower Service Manual. Hobar.

Application

DUTY AREA

17. CONSTRUCTING AND MAINTAINING LANDSCAPES AND GREENS FACILITIES

TASK / COMPETENCY

17.12 Spread salt on icy sidewalks and driveways

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (80360

17.12

PERFORMANCE OBJECTIVE

P17.12 Given an icy area on a sidewalk or driveway, rock salt, and a mechanical spreader (optional), spread salt on the sidewalk or driveway. Salt must be spread evenly on the ice with none spread over planted areas. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E17.12.1 Explain why salt is used to "melt" ice or snow.

E17.12.2 Identify advantages and disadvantages of using salt to remove snow or ice.

E17.12.3 Outline the operation of mechanical spreading equipment.

E17.12.4 Wash equipment after use.

CRITERION-REFERENCED MEASURE

C17.12 Salt spread evenly on icy sidewalk or driveway; no salt is spread on planted areas, and all safety precautions are observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Explain the effects of salt on ice or snow (E17.12.1).
2. Discuss advantages and disadvantages of using salt to remove snow or ice (E17.12.2).
3. Demonstrate and have students spread salt on icy sidewalks and driveways (E17.12.1-E17.12.4).

SELECTED TOOLS AND MATERIALS

Rock salt
Mechanical spreader (optional)

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 87.

Application

DUTY AREA

17. CONSTRUCTING AND MAINTAINING LANDSCAPES AND GREENS FACILITIES

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

17.13 Construct walls, walks, and landscape structures

COURSE

Horticulture IV (8036)

17.13

PERFORMANCE OBJECTIVE

P17.13 Given specifications and the necessary tools and materials, construct a wall, walk, or other landscape structure. All work must be aesthetically pleasing, functional, and accurate in accordance with instructor's guidelines or specifications.

SELECTED ENABLING OBJECTIVES

E17.13.1 Make a list of materials needed to construct a wall or walk.

E17.13.2 Identify different paving materials and landscape symbols for each.

E17.13.3 Outline procedure in constructing a stone retaining wall.

E17.13.4 Outline procedure in constructing a brick-paved walk.

E17.13.5 Mix concrete.

CRITERION-REFERENCED MEASURE

C17.13 Completed project is aesthetically pleasing, functional, and accurate in accordance with instructor's guidelines or specifications.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss principles involved in planning walls, walks, and other landscape structures (E17.13.1-E17.13.3).
2. Demonstrate how to construct walls, walks, and other landscape structures (E17.13.1-E17.13.5).
3. Have students construct walls, walks, and other landscape structures (E17.13.1-E17.13.5).
4. Arrange for students to tour community and observe outstanding landscaping constructions (E17.13.1-E17.13.4).

SELECTED TOOLS AND MATERIALS

Landscape plan
Level
Measuring tape
Selection of handtools
Stone, brick, and/or concrete
Handout: Instructor's guidelines or specifications

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Mechanics in Agriculture, 2nd ed., pp. 600-645. Phipps.
Landscape Design, pp. 104-137. Hannebaum.
Landscaping, 2nd ed., pp. 167-173. Ingels.

DUTY AREA

18. OPERATING AND MAINTAINING POWER EQUIPMENT

TASKS/COMPETENCIES

18.1 Operate pickup truck

18.2 Drive a tractor

18.3 Calibrate a tractor-mounted sprayer

18.4 Apply chemicals, using a tractor-mounted sprayer

18.5 Check tires and tire pressure on equipment

18.6 Service carburetor air cleaner

18.7 Replace spark plugs

18.8 Replace breaker points

18.9 Adjust engine idle speed setting

18.10 Service battery

18.11 Check radiator

18.12 Change oil and lubricate equipment

18.13 Clean and oil electric motors

18.14 Operate chain saw

Application

DUTY AREA

18. OPERATING AND MAINTAINING POWER EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

18.1 Operate pickup truck

COURSE

Horticulture IV (8036)

18.1

PERFORMANCE OBJECTIVE

P18.1 Given a pickup truck and an area for maneuvering the vehicle, operate the vehicle throughout the area making all turns and signals safely and correctly. All traffic rules, regulations, laws, and safety procedures must be obeyed.

SELECTED ENABLING OBJECTIVES

E18.1.1 Check the seat and adjust to a comfortable position.

E18.1.2 Fasten seat belts and/or harness.

E18.1.3 Check lights, horn, windshield wipers, and brakes for proper operation.

E18.1.4 Select neutral gear and start engine.

E18.1.5 Select power gear and gently accelerate.

E18.1.6 Maneuver vehicle through area, using proper gears, speeds, and brakes.

CRITERION-REFERENCED MEASURE

C18.1 Pickup truck operated correctly and safety with all traffic rules, regulations, and laws obeyed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Invite a driver education instructor to review with students important driving tips (E18.1.1-E18.1.6).
2. Arrange for students to practice in a driving simulator (E18.1.1-E18.1.6).
3. Demonstrate how to operate a pickup truck. Emphasize safety considerations (E18.1.1-E18.1.6).
4. Have students operate a pickup truck (E18.1.1-E18.1.6).

SELECTED TOOLS AND MATERIALS

Valid operator's license
Pickup truck
Operator's manual

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 14.
Mechanics in Agriculture, 2nd ed., pp. 450-456. Phipps.

Application

DUTY AREA

18. OPERATING AND MAINTAINING POWER EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

18.2 Drive a tractor

COURSE

Horticulture III (8034)

18.2

PERFORMANCE OBJECTIVE

P18.2 Given a tractor, an operator's manual, and a driving area with hills and obstacles, drive the tractor through the area, observing all safety rules and regulations. All items on instructor's checklist must be rated acceptable.

SELECTED ENABLING OBJECTIVES

E18.2.1 Check seat position and adjust, if needed.

E18.2.2 If tractor is stored in building, check for adequate ventilation before starting engine.

E18.2.3 Check fuel level.

E18.2.4 Open fuel supply or lines.

E18.2.5 Place transmission in proper setting for starting engine.

E18.2.6 Set speed control lever.

E18.2.7 Disengage clutch, if applicable.

E18.2.8 Set choke.

E18.2.9 Turn ignition switch to "on" position, if applicable.

E18.2.10 Start engine.

CRITERION-REFERENCED MEASURE

C18.2 Tractor driven safely and in accordance with all traffic rules and regulations; all items on instructor's checklist rated acceptable.

INSTRUCTOR'S CHECKLIST 18.2

DUTY: OPERATING AND MAINTAINING POWER EQUIPMENT

TASK: Drive a Tractor

ACTIVITY: Drive a tractor

ITEM	RATING*	
	Acceptable	Unacceptable
1. Engine started without excessive draining of battery power.		
2. Machine motion begun without jerks or grinding of gears.		
3. Correct gear selection made for level terrain.		
4. Speed selection of throttle setting correct for level terrain.		
5. Machine stopped without sliding tires.		
6. Correct gear selection made for hilly terrain.		
7. Correct speed or throttle setting used for hilly terrain.		
8. Tractor turned without tearing up sod or leaving black skid marks on pavement.		
9. All obstacles avoided.		
10. Hand signals used correctly.		
11. Engine stopped without exessive backfire.		

*All items must receive acceptable rating.

Source: Gardening-Groundskeeping. V-TECS.

SELECTED INSTRUCTIONAL ACTIVITIES

1. List and discuss rules and regulations related to tractor operation (E18.2.1-E18.2.10).
2. Demonstrate how to service and operate a tractor (E18.2.1-E18.2.10).
3. Locate a driving area and set up an obstacle course. Have students drive a tractor through the course (E18.2.1-E18.2.10).

SELECTED TOOLS AND MATERIALS

Operator's manual
Handout: Instructor's checklist

SELECTED AUDIOVISUAL MATERIALS

Filmstrip/Cassette: Tractor Operation and Safety. Bergwall Productions.

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 118.
Groundskeeping Equipment, Volume 1. AAVIM.
Mechanics in Agriculture, 2nd ed., pp. 457-473. Phipps.

DUTY AREA

18. OPERATING AND MAINTAINING POWER EQUIPMENT

TASK / COMPETENCY

18.3 Calibrate a tractor-mounted sprayer

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

18.3

PERFORMANCE OBJECTIVE

P18.3 Given a tractor-mounted sprayer, owner's manual, and auxiliary equipment, calibrate the sprayer to within ± 1% of the application rate as specified by the instructor.

SELECTED ENABLING OBJECTIVES

E18.3.1 Fill sprayer with water.

E18.3.2 Select a constant tractor speed and pump pressure suited to nozzles and terrain.

E18.3.3 Select appropriate nozzle.

E18.3.4 Measure and mark a specific distance of travel.

E18.3.5 With tractor running at selected constant speed, measure the time needed to travel the selected distance.

E18.3.6 With pump running at selected constant pressure, collect spray for the time needed to travel the measured distance.

E18.3.7 Determine amount of material sprayed.

E18.3.8 Calculate area sprayed in acres.

E18.3.9 Calculate amount of material sprayed on one acre.

E18.3.10 Determine amount of chemical needed to spray one acre.

E18.3.11 Determine amount of material to be added to one tank of water.

CRITERION-REFERENCED MEASURE

C18.3 Tractor-mounted sprayer calibrated within ± 1% of the application rate as specified by the instructor.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate the calibration of a tractor-mounted sprayer (E18.3.1-E18.3.11).
2. Have students practice determining amount of material sprayed and area sprayed in acres (E18.3.6-E18.3.11).
3. Have students calibrate sprayer (E18.3.1-E18.3.11).

SELECTED TOOLS AND MATERIALS

Owner's manual
Tractor
Tractor-mounted sprayer
Water
Tape

SELECTED AUDIOVISUAL MATERIALS

Slides: The Calibration of Low Pressure Field Sprayers. Ohio Curriculum Materials.

SELECTED REFERENCES

The Calibration of Low Pressure Field Sprayers, 1981. Ohio Curriculum Materials.
Gardening-Groundskeeping. V-TECS. Performance Objective 108.
Mechanics in Agriculture, 2nd ed., pp. 571-574. Phipps.
Pesticide Applicator Certification Training Manual. Virginia Cooperative Extension Service.

DUTY AREA

18. OPERATING AND MAINTAINING POWER EQUIPMENT

TASK / COMPETENCY

18.4 Apply chemicals, using a tractor-mounted sprayer

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture IV (8036)

18.4

PERFORMANCE OBJECTIVE

P18.4 Given the necessary supplies and equipment, a tractor-mounted sprayer, and chemicals, apply chemicals, using a tractor-mounted sprayer, to a lawn infested with pests. The amount of chemical applied should be within ± 5% of the manufacturer's amount recommended for the lawn size and pest infestation.

SELECTED ENABLING OBJECTIVES

E18.4.1	Remove or cover water containers and food sources in area.
E18.4.2	Read chemical labels completely.
E18.4.3	Put on protective mask, if applicable.
E18.4.4	Partially fill sprayer with water.
E18.4.5	Determine amount of chemical needed for area and amount of application.
E18.4.6	Add chemical to sprayer, carefully following label directions.
E18.4.7	Add surfactant, if applicable.
E18.4.8	Add water until sprayer is full.
E18.4.9	Thoroughly mix solution.
E18.4.10	Determine starting point and direction of travel.
E18.4.11	Start movement of tractor and open nozzle(s).
E18.4.12	Maintain constant ground speed until area is covered.
E18.4.13	Observe all safety precautions in hauling and applying chemical.

CRITERION-REFERENCED MEASURE

C18.4 Chemicals applied to a lawn infested with pests, using a tractor-mounted sprayer; amount of chemical applied within ± 5% of the amount recommended by the manufacturer for the lawn size and pest infestation. All safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review study of mixing and applying pesticides, insecticides, and fungicides. Task 7.7, 7.8 (E18.4.1-E18.4.8).
2. Emphasize all safety procedures (E18.4.1-E18.4.13).
3. Demonstrate how to use a tractor-mounted sprayer (E18.4.1-E18.4.11).
4. Discuss methods to discern severity of pest infestation (E18.4.4).
5. Have students apply chemicals to a pest infested area, using a tractor-mounted sprayer (E18.4.1-E18.4.13).

SELECTED TOOLS AND MATERIALS

Auxillary equipment
Owner's manual
Tractor
Tractor-mounted sprayer
Chemicals
Manufacturer's instructions

SELECTED AUDIOVISUAL MATERIALS

Film:	Be a Pro With Pesticides. Cornell University.
Slides/Cassette:	Applying Pesticides, Management, Application, Safety. AAVIM.

SELECTED REFERENCES

Applying Pesticides, Management, Application, Safety, 1980. AAVIM.
Gardening-Groundskeeping. V-TECS. Performance Objective 112.
Private Applicator Certification Training Manual. Virginia Cooperative Extension Service.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Invite a representative of a tire company to discuss various types of tires and to demonstrate the methods for checking tire pressure (E18.5.1, E18.5.3).
2. Review operator's manuals, noting tire pressure differences in various pieces of equipment (E18.5.1).
3. Demonstrate how to check tires and tire pressure on available wheeled power equipment (E18.5.1-E18.5.5).
4. Have students perform routine tire checks and maintenance (E18.5.1-E18.5.5).

SELECTED TOOLS AND MATERIALS

Operator's manuals
Tire pressure gauge
Source of compressed air

SELECTED AUDIOVISUAL MATERIALS

Slides: Tractor Operation and Daily Care. AAVIM.

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 130.
Groundskeeping Equipment, Volume 1, pp. 45-46. AAVIM.
Mechanics in Agriculture, 2nd ed., p. 465. Phipps.

Application

DUTY AREA

18. OPERATING AND MAINTAINING POWER EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

18.6 Service carburetor air cleaner

COURSE

Horticulture III (8034)

18.6

PERFORMANCE OBJECTIVE

P18.6 Given a truck, tractor, or small engine, screwdrivers, and clean rags, service a carburetor air cleaner. A visual inspection of the completed work must show that all dirt has been removed from the cleaner housing, the filter is clean, and that the cleaner has been securely installed. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E18.6.1 Disconnect spark plug wire as a safety precaution.

E18.6.2 Clean area around air cleaner and exterior of cleaner cover.

E18.6.3 Remove air cleaner cover.

E18.6.4 Cover air intake opening with clean rag.

E18.6.5 Clean interior of cover.

E18.6.6 Clean and/or replace filter element, using manufacturer's instructions.
Note: Most small engines have an oil-saturated air cleaning filter element which can be cleaned and restored.

E18.6.7 Check intake opening for clogged dirt. Clean as necessary.

E18.6.8 Remove protective cover from air intake opening.

E18.6.9 Wipe air intake opening clean.

E18.6.10 Replace air cleaner assembly.

E18.6.11 Reconnect spark plug wire.

CRITERION-REFERENCED MEASURE

C18.6 Visual inspection of serviced carburetor air cleaner shows all dirt removed from cleaner housing and filter and cleaner securely installed; all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Show slides, Small Engines, and discuss (E18.6.1-E18.6.11).
2. Demonstrate how to clean and service air cleaners on trucks, tractors, and small engines (E18.6.1-E18.6.11).
3. Have students clean and service air cleaners on available power equipment as required (E18.6.1-E18.6.11).

SELECTED TOOLS AND MATERIALS

Screwdrivers
Truck
Tractor
Lawnmower or other small engine
Clean motor oil
Clean rags
Service manual

SELECTED AUDIOVISUAL MATERIALS

Slides: Small Engines, Volume 1, Care and Operation. AAVIM.

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 142.
Small Engines, Volume 1, Care and Operation, 4th ed., pp. 32-43. AAVIM.
Small Gas Engines, pp. 63-65. Roth and Baird.

DUTY AREA

18. OPERATING AND MAINTAINING POWER EQUIPMENT

TASK / COMPETENCY

18.7 Replace spark plugs

Application

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

18.7

PERFORMANCE OBJECTIVE

P18.7 Given a truck, tractor, or small engine, replacement spark plug(s), the necessary tools, equipment, and manufacturer's specifications, replace the spark plugs. Spark plug gaps must conform to manufacturer's specifications, all seat washers must be properly seated, and insulators and threads must be undamaged.

SELECTED ENABLING OBJECTIVES

E18.7.1 Disconnect spark plug wires.

E18.7.2 Clean debris from around each spark plug.

E18.7.3 Loosen and remove spark plugs.

E18.7.4 Clean spark plugs.

E18.7.5 Check gap on each new spark plug.

E18.7.6 Gap each spark plug, using manufacturer's specifications.

E18.7.7 Replace each spark plug, using recommended torque.

E18.7.8 Connect spark plug wires.

CRITERION-REFERENCED MEASURE

P18.7 Spark plugs replaced with spark gap conforming to manufacturer's specifications, seat washers properly seated, and insulators and threads undamaged; all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Invite a professional mechanic to demonstrate procedures for replacing spark plugs (E18.7.1-E18.7.8).
2. Have students practice setting gaps on spark plugs (E18.7.5, E18.7.6).
3. Have students check and replace spark plugs on power equipment as required (E18.7.1-E18.7.8).

SELECTED TOOLS AND MATERIALS

Service manual
Spark plugs
Tractor, truck, or small engine
Spark plug socket

SELECTED AUDIOVISUAL MATERIALS

Slides: Small Engines, Volume 1, Care and Operation. AAVIM.

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 138.
Small Engines, Volume 1, Care and Operation, 4th ed., pp. 74-85. AAVIM.
Small Gasoline Engines, pp. 72-75. Roth and Baird.

DUTY AREA

18. OPERATING AND MAINTAINING POWER EQUIPMENT

TASK / COMPETENCY

18.8 Replace breaker points

Application

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

18.8

PERFORMANCE OBJECTIVE

P18.8 Given a truck, tractor, or small engine, manufacturer's manual, access to tools, equipment, and supplies, replace the breaker points on the engine. The breaker point gap should be set exactly as recommended by the engine manufacturer and must operate properly. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E18.8.1 Locate distributor.

E18.8.2 Clean dirt and/or debris from around distributor and remove cover.

E18.8.3 Remove breaker arm and spring.

E18.8.4 Remove stationary breaker point and bracket.

E18.8.5 Clean and lubricate cam.

E18.8.6 Reverse procedure to install new breaker points.

E18.8.7 Prior to replacing distributor cap, set breaker point gap:
  a. Loosen locking screw to allow for movement of breaker.
  b. Using screwdriver, open points to gap specified by manufacturer.
  c. Set point gap with feeler gauge. Note: a dial indicator or a dwell meter can also be used to set points. Follow test instrument manufacturer's specifications.

E18.8.8 Replace distributor cover.

CRITERION-REFERENCED MEASURE

C18.8 Breaker points replaced in accordance with engine manufacturer specifications and engine operates properly; all safety procedures observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Identify all tools and equipment and explain proper use (E18.8.1-E18.8.8).
2. Demonstrate how to check breaker points and replace points (E18.8.1-E18.8.8).
3. Have students check breaker points on a truck, tractor, or small engine and replace points, if necessary (E18.8.1-E18.8.8).

SELECTED TOOLS AND MATERIALS

Service manual
Screwdriver
Truck, tractor, or small engine
Small engine clutch wrench
Condenser
Breaker points
Feeler gauge

SELECTED AUDIOVISUAL MATERIALS

Slides: Small Engines, Volume 2, Maintenance and Repair. AAVIM.

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 139.
Small Engines, Volume 2, Maintenance and Repair, 4th ed., pp. 45-75. AAVIM.
Small Gasoline Engines, pp. 75-85. Roth and Baird.

Application

DUTY AREA

18. OPERATING AND MAINTAINING POWER EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

18.9 Adjust engine idle speed setting

COURSE

Horticulture III (8034)

18.9

PERFORMANCE OBJECTIVE

P18.9 Given a small engine, the manufacturer's manual, and a screwdriver, adjust the engine idle speed on the engine. The engine must idle at the recommended idle speed without overspeeding or underspeeding.

SELECTED ENABLING OBJECTIVES

E18.9.1 Check governor for bent links and wear. Repair as necessary.

E18.9.2 Determine recommended idle speed.

E18.9.3 Start engine and allow to warm up.

E18.9.4 Set to recommended idle speed.

E18.9.5 Adjust tension on governor until desired idle speed is maintained.

CRITERION-REFERENCED MEASURE

C18.9 Engine idle speed adjusted according to manufacturer's recommendations, and engine idles at recommended speed without overspeeding or underspeeding.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss instructions in operator's manual for adjusting engine idle speed (E18.9.2).
2. Demonstrate how to adjust idle speed on small engines (E18.9.1-E18.9.5).
3. Have students adjust idle speed on small engines (E18.9.1-E18.9.5).

SELECTED TOOLS AND MATERIALS

Small engine
Operator's manual
Screwdriver
Tachometer

SELECTED AUDIOVISUAL MATERIALS

Slides: Small Engines, Volume 1, Care and Operation. AAVIM.

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 141.
Small Engines, Volume 1, Care and Operation, 4th ed., pp. 108-109. AAVIM.

Application

DUTY AREA

18. OPERATING AND MAINTAINING POWER EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

18.10 Service battery

COURSE

Horticulture III (8034)

18.10

PERFORMANCE OBJECTIVE

P18.10 Given a vehicle with a regular battery, service the battery by checking the water level, removing corrosion around terminals, and adjusting support brackets. After the battery has been serviced, the water must be at the proper level, the terminals must be free of corrosion, and connections must be tight and in place. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E18.10.1 Remove caps from battery.

E18.10.2 Check water content and add distilled water as needed.

E18.10.3 Replace caps on battery.

E18.10.4 Clean terminals of corrosion.

E18.10.5 Adjust connections and support brackets.

CRITERION-REFERENCED MEASURE

C18.10 Serviced battery has water at the proper level, terminals free of corrosion, and connections tight and in place; all safety procedures observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Show filmstrip on battery care and discuss (E18.10.1-E18.10.5).

2. Demonstrate how to check and service batteries on various pieces of heavy duty power equipment (E18.10.1-E18.10.5).

3 Have students check and service batteries as required (E18.10.1-E18.10.5).

SELECTED TOOLS AND MATERIALS

Equipment with a battery
Baking soda
Box-end wrench set
Carrying strap
Clamp puller
Rags
Sandpaper
Terminal cleaning brush
Silicone spray

SELECTED AUDIOVISUAL MATERIALS

Filmstrip: Fleet Battery Care. General Motors.

SELECTED REFERENCES

Mechanics in Agriculture, p. 426. Phipps.
Small Engines, Volume 1, Care and Operation, 4th ed., pp. 111-123. AAVIM.
Tractor Maintenance, pp. 63-65. AAVIM.

Application

DUTY AREA

18. OPERATING AND MAINTAINING POWER EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

18.11 Check radiator

COURSE

Horticulture III (8034)

18.11

PERFORMANCE OBJECTIVE

P18.11 Given a vehicle with a water-cooled engine and a hydrometer for checking antifreeze, check radiator for leaks, water level, and antifreeze content. Findings must agree with those of the instructor.

SELECTED ENABLING OBJECTIVES

E18.11.1 Remove radiator cap.

E18.11.2 Check level of coolant (water or antifreeze).

E18.11.3 Check radiator for leaks.

E18.11.4 Start engine and check radiator hose for leaks.

E18.11.5 Demonstrate how to use a hydrometer.

CRITERION-REFERENCED MEASURE

C18.11 Radiator checked for leaks, water level, and antifreeze content; findings agree with those of the instructor.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Arrange for students to visit auto mechanics shop or a professional garage to see a demonstration on the use of a hydrometer (E18.11.5).

2. Demonstrate how to check the radiator on a water-cooled engine for leaks, water, and antifreeze content (E18.11.1-E18.11.5).

3. Have students check radiators as necessary on various types of water-cooled engines (E18.11.1-E18.11.5).

SELECTED TOOLS AND MATERIALS

Hydrometer
Water-cooled engine

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Grounds Keeping Equipment, Volume 1, pp. 39-40. AAVIM.
Tractor Maintenance, pp. 119-128. AAVIM.

— Application —

DUTY AREA

18. OPERATING AND MAINTAINING POWER EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

18.12 Change oil and lubricate equipment

COURSE

Horticulture III (8034)

18.12

PERFORMANCE OBJECTIVE

P18.12 Given a truck, tractor, or lawn mower, operator's manual, and the necessary oil, lubrication materials, and tools, change the oil and lubricate each grease fitting on the truck or tractor or friction point on the mower. A visual inspection of all lubrication points must indicate that each one has been serviced, and oil must be changed in accordance with operator's manual.

SELECTED ENABLING OBJECTIVES

E18.12.1 Locate lubrication points on machine.

E18.12.2 Determine type of lubrication fitting or opening.

E18.12.3 Determine proper lubricant for each fitting or opening.

E18.12.4 Interpret instructions in operator's manual for changing oil.

CRITERION-REFERENCED MEASURE

C18.12 Oil changed in accordance with operator's manual, and equipment lubricated properly as revealed by a visual inspection.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students locate all lubrication points on a truck, tractor, or lawn mower (E18.12.1).
2. Have students explain reasons for lubricating grease fittings and changing oil on truck or tractor engines (E18.12.1-E18.12.4).
3. Demonstrate how to change oil and oil filter (E18.12.4).
4. Have students change oil and oil filters as necessary (E18.12.4).

SELECTED TOOLS AND MATERIALS

Operator's manual
Truck, tractor, or lawn mower
Engine oil
Clean rags
Grease gun
Lubricant
Oil filter

SELECTED AUDIOVISUAL MATERIALS

Slides: Small Engines, Volume 1, Care and Operation. AAVIM.

SELECTED REFERENCES

Grounds Keeping Equipment, Volume 1, pp. 44-45. AAVIM.
Gardening-Groundskeeping. V-TECS. Performance Objectives 124 and 125.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss methods to remove dirt from interior parts of electric motors (E18.13.4).
2. Demonstrate cleaning and oiling electric motors (E18.13.1-E18.13.5).
3. Have students clean and oil an electric motor (E18.13.1-E18.13.5).

SELECTED TOOLS AND MATERIALS

Applicator
Clean cloth
Electric motor
Oil
Operator's manual
Vacuum cleaner
Compressed air

SELECTED AUDIOVISUAL MATERIALS

Audiovisual package and transparency masters: Electric Motors-Selection-Protection-Drives. AAVIM.

SELECTED REFERENCES

Electric Motors-Selection-Protection-Drives. Student Manual, Teacher's Guide, and Student Workbook. AAVIM.

DUTY AREA

18. OPERATING AND MAINTAINING POWER EQUIPMENT

TASK/COMPETENCY

18.14 Operate chain saw

Application

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture V (8038)

18.14

PERFORMANCE OBJECTIVE

P18.14 Given a chain saw instruction manual, hearing protectors, safety glasses, and several trees to be cut down and/or large branches to be removed, operate a chain saw to cut the trees down or prune standing trees. All work is to be done following the safety procedures outlined in the manual; trees are to be cut into firewood-size pieces with proper disposal of branches.

SELECTED ENABLING OBJECTIVES

E18.14.1 Name primary parts of a chain saw.

E18.14.2 Refuel and add chain saw oil.

E18.14.3 Identify safety features of various chain saws.

E18.14.4 Outline safe procedure for cutting down a tree.

CRITERION-REFERENCED MEASURE

C18.14 Chain saw operated to cut down or prune trees; saw operated in accordance with instructor manual; all safety procedures observed; trees cut into firewood pieces with proper disposal of branches.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students identify the primary parts of a chain saw (E18.14.1).
2. Discuss safety features of a chain saw (E18.14.2).
3. Demonstrate safe procedure for cutting down a tree (E18.14.3).
4. Have students practice using a chain saw (E18.14.1-E18.14.4).

SELECTED TOOLS AND MATERIALS

Instruction manual
Chain saw
Hearing protectors
Safety glasses
Fuel
Chain saw oil

SELECTED AUDIOVISUAL MATERIALS

Slides/Cassette: Chain Saw Operation-Safety in the Field. Hobar.
Chain Saw Maintenance. Hobar.

SELECTED REFERENCES

Chain Saw Safety. Pamphlet from Omark Industries.
A Close Look at Saw Chain. Pamphlet from Omark Industries.
Chain Saw Service Manual. Hobar.
Saw Chain Maintenance Manual. Omark Industries.

DUTY AREA

19. MAINTAINING AND REPAIRING EQUIPMENT

TASKS/COMPETENCIES

19.1 Clean and sharpen hand tools

19.2 Replace a broken tool handle

19.3 Repair irrigation and spray system plumbing

19.4 Sharpen and balance rotary mower blade

19.5 Repair electrical service cords

19.6 Replace and glaze broken greenhouse lights

19.7 Replace plastic covering for greenhouse

19.8 Replace damaged section of shade cloth

19.9 Replace damaged support wires for shade or black cloth

19.10 Repair wooden greenhouse benches

19.11 Paint greenhouse frames, equipment, and other structures

Application

DUTY AREA

19. MAINTAINING AND REPAIRING EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

19.1 Clean and sharpen hand tools

COURSE

Horticulture III (8034)

19.1

PERFORMANCE OBJECTIVE

P19.1 Given hand tools which include a knife, hoe, spade, and/or pruning shears, and a work bench with a vise and the necessary files, emery wheels, whetstones, or other required equipment, clean and sharpen the assigned hand tools. Tools must be sharpened to the correct cutting edge, and all safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E19.1.1 Select appropriate instructional manuals and guides.

E19.1.2 Select the appropriate items for sharpening a given tool.

E19.1.3 List all safety precautions.

E19.1.4 Compare new tool edges with those to be sharpened.

E19.1.5 Remove rust, grease, or dirt from the tool.

E19.1.6 Sharpen tools to achieve proper blade sharpness and angle edge of the blade.

E19.1.7 Apply a protective coating to sharpened area.

E19.1.8 Clean all tools and equipment used in the sharpening process and return them to storage.

CRITERION-REFERENCED MEASURE

C19.1 Tools cleaned and sharpened to the correct cutting edge with all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students select appropriate instructional manuals and guides (E19.1.1).
2. Identify tools which need sharpening (E19.1.2).
3. Demonstrate how to sharpen hand tools (E19.1.3-E19.1.6).
4. Discuss safety precautions (E19.1.3).
5. Provide students with new tools to use as a model (E19.1.4).
6. Have students practice sharpening knives, hoes, spades, pruning shears, or other hand tools (E19.1.1-E19.1.8).
7. Discuss with students the correct protective coating to apply to the sharpened areas of various tools (E19.1.8).

SELECTED TOOLS AND MATERIALS

Dull hand tools
New hand tools
Emery wheels
Whetstones
Files
Vise

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 88.
Gardening-Groundskeeping. V-TECS. Performance Objective 127.
Mechanics in Agriculture, 2nd ed., pp. 120-154. Phipps.
Working in Agricultural Mechanics, pp. 243-274. Shinn and Weston.

DUTY AREA

19. MAINTAINING AND REPAIRING EQUIPMENT

TASK / COMPETENCY

19.2 Replace a broken tool handle

—— Application ——

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

19.2

PERFORMANCE OBJECTIVE

P19.2 Given access to repair tools and supplies, replace a broken tool handle. The handle and tool must correspond in terms of size and appearance. The new handle should fit neatly and must not work loose during use.

SELECTED ENABLING OBJECTIVES

E19.2.1 Secure tool in vise.

E19.2.2 Remove old handle.

E19.2.3 Recondition tool, if applicable.

E19.2.4 Fit new handle to tool.

E19.2.5 Secure new handle in tool. Use appropriate wedges to ensure tight fit.

E19.2.6 Apply protective coating to handle.

CRITERION-REFERENCED MEASURE

C19.2 Broken tool handle replaced; new handle corresponds in terms of size and appearance, fits neatly, and does not work loose.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate how to repair broken handles on hand tools (E19.2.1-E19.2.6).
2. Have students repair or replace broken handles on hand tools as required (E19.2.1-E19.2.6).
3. Have students compare costs of new tools with cost of replacement parts (E19.2.1-E19.2.6).

SELECTED TOOLS AND MATERIALS

Drill hacksaw
Ball-peen hammer
Punch
Handle wedges
Wood rasp
Half-round wood file
Mallet
Varnish or boiled linseed oil
Wood blocks

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 136.
Mechanics in Agriculture, 2nd ed., pp. 142-154. Phipps.

DUTY AREA

19. MAINTAINING AND REPAIRING EQUIPMENT

PROGRAM

HORTICULTURE (01.0610)

TASK/COMPETENCY

19.3 Repair irrigation and spray system plumbing

COURSE

Horticulture IV (8036)

19.3

PERFORMANCE OBJECTIVE

P19.3 Given malfunctioning irrigation, spray, or other watering systems and the necessary tools, equipment, or replacement parts, repair the irrigation and spray system plumbing. The repaired system must function correctly and in accordance with instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E19.3.1 Demonstrate how to repair a leaking water faucet.

E19.3.2 Demonstrate how to replace head, pipe, and valves on a sprinkler or mist irrigation system.

E19.3.3 Demonstrate how to repair lines and nozzles on spray equipment.

CRITERION-REFERENCED MEASURE

C19.3 Irrigation and spray system plumbing repaired correctly in accordance with instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Invite a plumber to provide students with a demonstration on using plumbing tools and making repairs (E19.3.1).
2. Provide students with V-TECS Performance Guide 132 Gardening-Groundskeeping. Demonstrate repairing a leaking faucet and have students practice the task (E19.3.1).
3. Provide students with V-TECS Performance Guide 102 Gardening-Groundskeeping. Have students replace pipes, sprinkler heads, mist heads or valves, or gaskets (E19.3.2).
4. Provide students with V-TECS Performance Guide 70 Nursery Production. Demonstrate how to repair lines and nozzles on spray equipment. Have students perform routine maintenance checks on spray equipment and make repairs as needed (E19.3.3).

SELECTED TOOLS AND MATERIALS

Handout: Instructor's guidelines
Irrigation system
Knife
Replacement parts
Sasher
Screwdriver
Seat-dressing tool
Spray equipment
Wrench

SELECTED AUDIOVISUAL MATERIALS

Filmstrip: Basic Plumbing Skills. Hobar.
Slide/Cassette: Laboratory Exercise in Pipe Fitting. Hobar.

SELECTED REFERENCES

Basic Plumbing. Hobar.
Gardening-Groundskeeping. V-TECS. Performance Objectives 102 and 132.
Nursery Production. V-TECS. Performance Objective 70.

Application

DUTY AREA

19. MAINTAINING AND REPAIRING EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

19.4 Sharpen and balance rotary mower blade

COURSE

Horticulture IV (8036)

19.4

PERFORMANCE OBJECTIVE

P19.4 Given a rotary blade, grinder, and balance cone, sharpen and balance the blade. The cutting edge angle should be between 28° and 32° after sharpening. The blade is balanced if blade end drops no more than 1" when tested on a balance cone. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E19.4.1 Follow safety rules.

E19.4.2 Dress and true grinding wheel.

E19.4.3 Hold blade firmly with both hands and against tool rest.

E19.4.4 Sharpen ends of blade between 28° and 32°.

E19.4.5 Check balance blade on balance cone.

E19.4.6 Balance blade by removing metal with grinder on back side of appropriate blade end.

CRITERION-REFERENCED MEASURE

C19.4 Rotary mower blade sharpened and balanced with cutting edge angle between 28° and 32°; blade end drops no more than 1" on a balance cone, and all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review safety procedures on using a grinding wheel (E19.4.1).
2. Have students observe a demonstration on how to sharpen a rotary mower blade and then practice doing this task by following designated procedural steps (E19.4.1-E19.4.6).

SELECTED TOOLS AND MATERIALS

Balance cone
Rotary mower blade
Emery wheel dresser
Safety glasses

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Mechanics in Agriculture, 2nd ed., pp. 121-122. Phipps.
Working in Agricultural Mechanics, pp. 243-256. Shinn and Weston.

DUTY AREA

19. MAINTAINING AND REPAIRING EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

19.5 Repair electrical service cords

COURSE

Horticulture III (8034)

19.5

PERFORMANCE OBJECTIVE

P19.5 Given a damaged service cord and access to repair tools and parts, repair an electrical service cord. No wires on the end of the cord should be exposed and contact connections must be tight. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E19.5.1 Replace attachment plug.

E19.5.2 Trim end of cord, if possible.

E19.5.3 Run cord through plug, if applicable.

E19.5.4 Remove outer insulation.

E19.5.5 Tie underwriter's knot in cord, if possible.

E19.5.6 Remove only enough insulation from each wire to hook around terminal screws.

E19.5.7 Place wire around terminal screw and tighten. Follow color code and ground proper terminals.

E19.5.8 Replace cover on end of plug.

CRITERION-REFERENCED MEASURE

C19.5 Electrical service cord repaired with no wires on end of cord exposed and contact connections tight; all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Demonstrate and have students practice repairing electrical service cords by following designated procedural steps (E19.5.1-E19.5.8).
2. Have students construct service cords for use in the horticulture shop (E19.5.1-E19.5.8).
3. Review all safety aspects (E19.5.1-E19.5.8).

SELECTED TOOLS AND MATERIALS

Wire cutter
Knife
Screwdriver
Wire stripper

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Gardening-Groundskeeping. V-TECS. Performance Objective 137.
Maintaining the Lighting and Wiring System, pp. 7-13. AAVIM.

DUTY AREA

19. MAINTAINING AND REPAIRING EQUIPMENT

PROGRAM

HORTICULTURE (01.0610)

TASK/COMPETENCY

19.6 Replace and glaze broken greenhouse lights

COURSE

Horticulture IV (8036)

19.6

PERFORMANCE OBJECTIVE

P19.6 Given greenhouse with broken glass, replacement glass, glazing compound, and all necessary tools, replace broken glass and apply glazing compound to form a waterproof seal. New glass must be firmly fitted and well secured. Glazing must be applied in a manner that prevents leakage. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E19.6.1 Locate broken glass.

E19.6.2 Place ladder in position on roof and remove bar cap.

E19.6.3 Remove broken glass.

E19.6.4 Remove old putty from roof bar.

E19.6.5 Apply glazing compound to bar.

E19.6.6 Position new glass properly and firm down in putty.

E19.6.7 Install retainer clips.

E19.6.8 Replace bar cap.

E19.6.9 Return all equipment to proper storage.

CRITERION-REFERENCED MEASURE

C19.6 Broken greenhouse light replaced so that new glass fits firmly, is well secured, and glazing compound applied correctly to prevent leakage; all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss the proper use of ladders (E19.6.2).
2. Demonstrate and explain proper procedures for replacing broken greenhouse lights (E19.6.1-E19.6.9).
3. Have students identify and discuss all safety precautions (E19.6.9).

SELECTED TOOLS AND MATERIALS

Putty knife
Chisel
Glazing compound
Replacement glass

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objective 92.
Mechanics in Agriculture, 2nd ed., pp. 224-227. Phipps.
Working in Horticulture, pp. 219-220. Richardson and Moore.

DUTY AREA

19. MAINTAINING AND REPAIRING EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

19.7 Replace plastic covering for greenhouse

COURSE

Horticulture IV (8036)

19.7

PERFORMANCE OBJECTIVE

P19.7 Given a greenhouse with torn or damaged plastic covering, the plastic required for replacement, and the necessary tools and equipment, replace the plastic covering. The new plastic must be installed in such a way that it is well aligned, secured firmly, presents a neat appearance, and restricts the entry of air, wind, and water.

SELECTED ENABLING OBJECTIVES

E19.7.1 Select the type of plastic to use.

E19.7.2 Identify greenhouse area sections in which plastic is to be replaced.

E19.7.3 Remove torn or worn plastic and dispose of appropriately.

E19.7.4 Remove old staples, nails, etc., and smooth any rough or splintered wooden edges.

E19.7.5 Cut new plastic to fit.

E19.7.6 Install new plastic.

E19.7.7 Return tools and materials to storage.

CRITERION-REFERENCED MEASURE

C19.7 Plastic covering for greenhouse replaced; new plastic covering is well aligned, secured firmly, neat, and restricts entry of air, wind, and water.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with samples of different types of coverings and discuss the advantages and disadvantages of each (E19.7.1).
2. Show Greenhouse and Related Structures slides and discuss (E19.7.2-E19.7.6).
3. Demonstrate replacing plastic covering (E19.7.1-E19.7.7).

SELECTED TOOLS AND MATERIALS

Staples
Knife
Sandpaper
Pliers
Screwdriver
Plastic samples
Replacement plastic coverings

SELECTED AUDIOVISUAL MATERIALS

Slides: Greenhouse and Related Structures. Ohio Curriculum Materials.

SELECTED REFERENCES

The Commercial Greenhouse, pp. 37-44. Boodley.
Floriculture Worker. V-TECS. Performance Objective 93.
Greenhouse Operation and Management, 2nd ed., pp. 40-52.
Working in Horticulture, pp. 219-221. Richardson and Moore.

Application

DUTY AREA

19. MAINTAINING AND REPAIRING EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

19.8 Replace damaged section of shade cloth

COURSE

Horticulture IV (8036)

19.8

PERFORMANCE OBJECTIVE

P19.8 Given the necessary tools and materials and a greenhouse or shadehouse superstructure in which sections of the shade cloth are damaged and need to be replaced, replace the damaged sections. The damaged sections of shade must be replaced in such a way that they are attractive in appearance, and will not tear loose from the greenhouse or shadehouse superstructure.

SELECTED ENABLING OBJECTIVES

E19.8.1 Select the type of shade cloth to use.

E19.8.2 Measure sections of damaged shade and cut the necessary pieces of saran to replace the worn or damaged area.

E19.8.3 Stretch shade to allow for expansion and tack in place.

E19.8.4 Secure shade by use of an overlay of lath or other materials to prevent tearing.

E19.8.5 Return tools and materials to storage.

CRITERION-REFERENCED MEASURE

C19.8 Damaged section of shade cloth replaced in an attractive manner and secured firmly.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review study of installing shade cloth, Task 8.4 (E19.8.1-E19.8.5).
2. Discuss the types of shade cloth (E19.8.1).
3. Have students observe a demonstration and then practice replacing a damaged section of shade cloth by following designated procedural steps (E19.8.1-E19.8.5).

SELECTED TOOLS AND MATERIALS

Shade cloth
Shade cloth examples
Lath strips

SELECTED AUDIOVISUAL MATERIALS

Slides: Greenhouse and Related Structures. Ohio Curriculum Materials.

SELECTED REFERENCES

The Commercial Greenhouse, pp. 43-44. Boodley.
Floriculture Worker. V-TECS. Performance Objective 95.

DUTY AREA

19. MAINTAINING AND REPAIRING EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

19.9 Replace damaged support wires for shade or black cloth

COURSE

Horticulture IV (8036)

19.9

PERFORMANCE OBJECTIVE

P19.9 Given the necessary wire and tools, replace damaged support wires for shade or black cloth. Support wires must be securely fastened to the framework of the greenhouse or shadehouse, spaced 24 inches apart and tight enough to provide the necessary support without damaging the superstructure. All safety procedures must be observed.

SELECTED ENABLING OBJECTIVES

E19.9.1 Examine the designated greenhouse or shadehouse area to determine the length and number of wires requiring replacement.

E19.9.2 Measure and cut wire for replacement.

E19.9.3 Secure one end of each wire to be used as a replacement to the framework of the greenhouse or shadehouse.

E19.9.4 Stretch each wire to desired tightness and secure it.

E19.9.5 Return tools and materials to storage.

CRITERION-REFERENCED MEASURE

C19.9 Damaged support wires for shade or black cloth replaced. Support wires fastened securely to framework, spaced 24 inches apart and tight enough to provide necessary support without damage to superstructure. All safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Review study of installing shade and black cloths, Tasks 8.4, 8.5 (E19.9.3-E19.9.5).
2. Demonstrate replacing damaged support wires for shade or black cloth (E19.9.1-E19.9.5).
3. Have students practice replacing damaged support wires E(19.9.1-E19.9.5).

SELECTED TOOLS AND MATERIALS

Wire cutters
Wire

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, p. 44. Boodley.

Application

DUTY AREA

19. MAINTAINING AND REPAIRING EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

19.10 Repair wooden greenhouse benches

COURSE

Horticulture III (8034)

19.10

PERFORMANCE OBJECTIVE

P19.10 Given the necessary tools and/or materials required for making repairs, repair wooden greenhouse benches. Repairs must restore the benches to utility, be attractive, and be of sturdy construction. All safety precautions must be observed.

SELECTED ENABLING OBJECTIVES

E19.10.1 Identify the benches which require repairs.

E19.10.2 Determine the nature and extent of the repairs needed.

E19.10.3 Remove plants and media from the benches to be repaired.

E19.10.4 Square off and mark the area to be repaired.

E19.10.5 Remove damaged portion of the bench.

E19.10.6 Measure and fit new portion to bench. Replacement portion should be made of treated woods.

E19.10.7 Clean area and return material to storage.

CRITERION-REFERENCED MEASURE

C19.10 Wooden greenhouse benches restored to utility and are attractive and of sturdy construction; all safety precautions observed.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students select benches needing repairs (E19.10.1, E19.10.2).
2. Discuss safety procedures associated with the use of various tools (E19.10.1-E19.10.7).
3. Have students repair benches (E19.10.3-E19.10.7).

SELECTED TOOLS AND MATERIALS

Wood (treated)
Square
Nails and screws
Hammer

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

The Commercial Greenhouse, pp. 55-59. Boodley.
Floriculture Worker. V-TECS. Performance Objective 89.
Greenhouse Operation and Management, 2nd ed., pp. 63-71. Nelson.

Application

DUTY AREA

19. MAINTAINING AND REPAIRING EQUIPMENT

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

19.11 Paint greenhouse frames, equipment, and other structures

COURSE

Horticulture III (8034)

19.11

PERFORMANCE OBJECTIVE

P19.11 Given paint, supplies, and equipment, paint greenhouse frames, equipment, and other structures. Paint should be applied evenly without streaks or runs.

SELECTED ENABLING OBJECTIVES

E19.11.1 Remove loose paint, rust, and corrosion and prepare surface to be painted.

E19.11.2 Mix paint according to color chart to get desired color.

E19.11.3 Add thinner or thinning agent, if required, and stir thoroughly.

E19.11.4 Apply paint with spray gun or most suitable applicator available.

E19.11.5 Apply second coat of paint, if required.

E19.11.6 Clean all applicators and equipment following use.

E19.11.7 Discard and dispose of empty containers and refuse.

CRITERION-REFERENCED MEASURE

C19.11 Greenhouse frames, equipment, and other structures painted evenly without paint streaking or running.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss the qualities of different types of paint (E19.11.1-E19.11.7).
2. Demonstrate ways to prepare an item for painting (E19.11.1).
3. Demonstrate the proper procedure for painting (E19.11.7).
4. Demonstrate the proper techniques of cleaning a brush (E19.11.6).
5. Have students prepare and paint items in the greenhouse (E19.11.1-E19.11.7).

SELECTED TOOLS AND MATERIALS

Paint
Paint brush or spray gun
Wire brush
Sandpaper
Thinning agent
Items to be painted
Paint brush
Clean rags
Steel wool

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Floriculture Worker. V-TECS. Performance Objectives 90 and 91.
Gardening-Groundskeeping. V-TECS. Performance Objective 99.
Mechanics in Agriculture, 2nd ed., pp. 195-223. Phipps.
Nursery Production. V-TECS. Performance Objective 72.

DUTY AREA

20. INVESTIGATING JOB OPPORTUNITIES AND REQUIREMENTS

TASKS/COMPETENCIES

20.1 Define terms related to the nature, scope, and importance of the horticulture industry

20.2 Identify and analyze job-related interests, aptitudes, and skills

20.3 Research and write a report on horticulture occupations

20.4 Locate job vacancies

20.5 Apply and interview for a job

20.6 Select and list qualities or traits needed for job success

DUTY AREA

20. INVESTIGATING JOB OPPORTUNITIES AND REQUIREMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

20.1 Define terms related to the nature, scope, and importance of the horticulture industry

COURSE

Horticulture III (8034)

20.1

PERFORMANCE OBJECTIVE

P20.1 Given resources, necessary instruction, and a written quiz, define the following terms related to the nature, scope, and importance of the horticulture industry: horticulture, aesthetic, floriculture, pomology, olericulture, arboriculture, climatic zone, and regional temperature zones with 85% accuracy.

SELECTED ENABLING OBJECTIVES

E20.1.1 Define: horticulture, agronomy, botony, forestry, intensive, aesthetic, ornamental, and USDA.

E20.1.2 Describe the relationship between horticulture and related plant sciences.

E20.1.3 Name the four branches of horticulture and describe the kind of work involved in each branch:
  a. Floriculture, turf, landscaping, and nursery production
  b. Fruit production (pomology)
  c. Vegetable production (olericulture)
  d. Tree and shrub cultivation (arboriculture).

E20.1.4 Describe the effects of climate on the horticulture industry.

CRITERION-REFERENCED MEASURE

C20.1 Terms related to the nature, scope, and importance of the horticulture industry defined on a written quiz with 85% accuracy.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with a list of vocabulary words related to the horticulture industry and discuss each one (E20.1.1-E20.1.3).
2. Give an overview of the horticulture industry (E20.1.3).
3. Display maps to illustrate zones of plant hardiness, average dates of first killing frost in fall, and average dates of last killing frost in spring. Relate to the nature and scope of horticulture by regions (E20.1.4).

SELECTED TOOLS AND MATERIALS

Maps of regional temperate zones
Handout: Written quiz

SELECTED AUDIOVISUAL MATERIALS

Slides or Cassettes:	What is Horticulture? Ohio Curriculum Materials.
Transparencies:	"Careers in Horticulture," Illustrated Horticulture.

SELECTED REFERENCES

Careers in Horticulture. Pamphlet from Ohio Curriculum Materials.
The Commercial Greenhouse, Chapter 3. Boodley.
Dictionary of Occupational Titles. U.S. Department of Labor, Employment and Training Administration.
Introductory Horticulture, pp. 1-12. Reiley and Shry.
Occupational Outlook Handbook. U.S. Department of Labor, Bureau of Labor Statistics.
Working in Horticulture, Chapter 1. Richardson and Moore.

DUTY AREA

20. INVESTIGATING JOB OPPORTUNITIES AND REQUIREMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

20.2 Identify and analyze job-related interests, aptitudes, and skills

COURSE

Horticulture III (8034)

20.2

PERFORMANCE OBJECTIVE

P20.2 Given inventories, questionnaires, or worksheets, identify and analyze job-related interests, aptitudes, and skills and make a list of possible jobs suited to individual skills, aptitudes, and interests. All questions on an instructor-provided worksheet must be answered.

SELECTED ENABLING OBJECTIVES

E20.2.1 Define interests, skills, and aptitudes.

E20.2.2 Inventory personal and job interests.

E20.2.3 Identify and analyze personal, social, mental, and physical aptitudes.

E20.2.4 Identify "marketable skills" in horticulture that are transferrable to other occupational areas.

E20.2.5 Identify short-term and long-term career goals.

CRITERION-REFERENCED MEASURE

C20.2 Job-related interests, aptitudes, and skills identified and analyzed on an instructor-provided worksheet; all questions answered.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Provide students with a handout which contains examples of interests, skills, and aptitudes. Have students identify each example and explain their answers (E20.2.1).
2. Discuss the various reasons people have for choosing a specific job (E20.2.1-E20.2.5).
3. Have students complete personal job interest worksheets (E20.2.2).
4. Have students fill out aptitude questionnaires or inventories (E20.2.3).
5. Have students, working in small groups, devise a list of skills that can be used in various occupational areas. A representative of each group should present the finished list to the rest of the class. Have students discuss (E20.2.4).
6. Assist students in identifying immediate- and long-term educational and career goals (E20.2.5).

SELECTED TOOLS AND MATERIALS

Handouts: Instructor-provided worksheet
Listing of interests, skills, and aptitudes examples
Sample aptitude questionnaires and/or inventories

SELECTED AUDIOVISUAL MATERIALS

Filmstrip: Job Hunting in the 1980's: Skills for Success. Guidance Associates.

SELECTED REFERENCES

Education for Employment/Work Experience Cooperative Education Program Instructional Materials Manual. Virginia Department of Education.
Working in Horticulture, Chapter 23. Richardson and Moore.

DUTY AREA

20. INVESTIGATING JOB OPPORTUNITIES AND REQUIREMENTS

TASK / COMPETENCY

20.3 Research and write a report on horticulture occupations

Application

PROGRAM

HORTICULTURE (01.0601)

COURSE

Horticulture III (8034)

20.3

PERFORMANCE OBJECTIVE

P20.3 Given career information and resources concerning agricultural and horticultural occupations, research and write a report on two horticultural occupations. Report must include qualifications, location, advancement opportunities, salary range, benefits, education and skills required, working conditions, job duties, and advantages and disadvantages.

SELECTED ENABLING OBJECTIVES

E20.3.1 Define: professional, occupation, job, career, work, apprentice, wage, salary, fringe benefit, and career ladder.

E20.3.2 Locate and collect occupational information from the DOT, and Occupational Outlook Handbook and other references.

E20.3.3 List examples of production, sales, and service jobs.

E20.3.4 Identify personal and technical skills required for entry-level positions in horticulture.

E20.3.5 Describe a typical career ladder in the horticulture industry.

E20.3.6 Outline a model vocational horticulture education program.

CRITERION-REFERENCED MEASURE

C20.3 Two horticulture occupations researched and a report written. Report includes qualifications, location, advancement opportunities, salary range, benefits, education and skills required, working conditions, job duties, and advantages and disadvantages.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss occupational terms using examples from agriculture-related occupations (E20.3.1).
2. Collect and display pictures to illustrate a variety of jobs within the horticultural occupational field (E20.3.1-E20.3.6).
3. Demonstrate how to use the Dictionary of Occupational Titles and Occupational Outlook Handbook (E20.3.2).
4. Provide pamphlets and other career information references (E20.3.1-E20.3.6).
5. Take field trips to local industries and/or invite incumbent workers to speak to students about jobs and careers in agriculture (E20.3.1-E20.3.6).

SELECTED TOOLS AND MATERIALS

None identified

SELECTED AUDIOVISUAL MATERIALS

Transparencies: "Careers in Horticulture," Illustrated Horticulture.

SELECTED REFERENCES

Dictionary of Occupational Titles. U.S. Department of Labor, Employment and Training Administration.
Occupational Outlook Handbook. U.S. Department of Labor, Bureau of Labor Statistics.
Introductory Horticulture, pp. 1-12. Reiley and Shry.
Careers in Horticulture, 1981. Pamphlet from Ohio Curriculum Materials.
Working in Horticulture, Chapter 2. Richardson and Moore.

DUTY AREA

20. INVESTIGATING JOB OPPORTUNITIES AND REQUIREMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

20.4 Locate job vacancies

COURSE

Horticulture III (8034)

20.4

PERFORMANCE OBJECTIVE

P20.4 Given newspapers, school job placement resources, or access to public employment agencies, locate and report on three job vacancies in the field of horticulture. Report must include a job description, salary, hours, working conditions, benefits, location, and required qualifications.

SELECTED ENABLING OBJECTIVES

E20.4.1 Name three sources for finding a job.

E20.4.2 Identify factors to consider in finding the right job.

E20.4.3 Collect help wanted classified ads for jobs in the horticulture field.

E20.4.4 Identify after school and summer part-time employment opportunities.

CRITERION-REFERENCED MEASURE

C20.4 Three job vacancies located, and a report written which includes job description, hours, working conditions, benefits, location, and required qualifications for each.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display and discuss sample advertisements. Have students collect employment ads from a local newspaper (E20.4.1-E20.4.3).

2. Have students investigate job vacancies found advertised in local newspapers, school placement offices, and the public employment office (E20.4.1).

3. Invite a job placement or career counselor to speak to class (E20.4.1-E20.4.4).

4. Discuss emerging job opportunities in the field of horticulture. Examples: Lawn care, interior landscape design and maintenance, and house plant care services (E20.4.1-E20.4.4).

SELECTED TOOLS AND MATERIALS

Sample resume
Sample application forms from employment agencies
Sample advertisements
Local newspapers
Trade journals

SELECTED AUDIOVISUAL MATERIALS

Filmstrips, Sound-slide, and Videocassette: Jobs for the 80's: Where the Opportunities Are. Guidance Associates.

SELECTED REFERENCES

Locating Your Job, 1977. Ohio Curriculum Materials.
Working in Horticulture, pp. 338-340. Richardson and Moore.

DUTY AREA

20. INVESTIGATING JOB OPPORTUNITIES AND REQUIREMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK / COMPETENCY

20.5 Apply and interview for a job

COURSE

Horticulture III (8034)

20.5

PERFORMANCE OBJECTIVE

P20.5 Given instructions, a personal data sheet (resume), a blank application form, and a role-playing situation with a job interviewer, apply and interview for a job. Performance will be evaluated in accordance with guidelines provided by the instructor.

SELECTED ENABLING OBJECTIVES

E20.5.1 Prepare a personal data sheet or resume.

E20.5.2 Explain the purpose of the job application.

E20.5.3 List types of information usually requested on job application forms.

E20.5.4 Fill out sample job application forms.

E20.5.5 Explain the importance of the interview.

E20.5.6 List and discuss guidelines for an effective job interview.

E20.5.7 Identify attitudes and behaviors to avoid in an interview.

CRITERION-REFERENCED MEASURE

C20.5 Applied and interviewed for a job in a role play situation in accordance with instructor-provided guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Invite a guidance counselor or job placement expert to discuss the job application and interviewing processes (E20.5.1-E20.5.6).
2. Have students compile a personal data sheet or resume (E20.5.1).
3. Display a variety of application forms and have students discuss similarities and differences (E20.5.2-E20.5.4).
4. Discuss and demonstrate job interview do's and don'ts. Have students practice role-playing job interview situations (E20.5.5, E20.5.6).
5. Provide students with information on local job interview and application practices and procedures (E20.5.1-E20.5.6).
6. Have students fill out application forms and participate in simulated job interview situations. Provide students with a list of performance evaluation criteria (E20.5.1-E20.5.6).

SELECTED TOOLS AND MATERIALS

Sample personal data sheets or resumes
Sample job application forms
Handout: Instructor-provided guidelines

SELECTED AUDIOVISUAL MATERIALS

Film: Your Job—Applying for It (42609). Virginia Department of Education.

SELECTED REFERENCES

Education for Employment/Work Experience Cooperative Education Program Instructional Materials Manual. Virginia Department of Education.
Jobs: Seeking, Finding, Keeping. Maryland State Department of Education.

DUTY AREA

20. INVESTIGATING JOB OPPORTUNITIES AND REQUIREMENTS

PROGRAM

HORTICULTURE (01.0601)

TASK/COMPETENCY

20.6 Select and list qualities or traits needed for job success

COURSE

Horticulture III (8034)

20.6

PERFORMANCE OBJECTIVE

P20.6 Given a list of personal traits on an instructor-prepared worksheet, select qualities or traits needed for job success with 90% accuracy.

SELECTED ENABLING OBJECTIVES

E20.6.1 Define terms related to personality development, such as self-esteem, motivation, self-concept, trait, and attitude.

E20.6.2 Describe desirable personal traits.

E20.6.3 Describe undesirable personal traits.

E20.6.4 Explain why employees in the horticulture industry must understand plant parts and functions, how plants grow, and how to identify horticultural plants.

E20.6.5 List ways to help maintain effective customer relationships in sales and service occupations.

CRITERION-REFERENCED MEASURE

C20.6 Qualities or traits needed for job success selected on an instructor-prepared worksheet with 90% accuracy.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss key terms and concepts related to personality development (E20.6.1).
2. Using several case studies, have students discuss apparent reasons why a person loses a job, keeps a job, or is promoted in a job (E20.6.2-E20.6.3).
3. Invite local employers and/or employees in the horticultural or agricultural field to discuss job success with students (E20.6.1-E20.6.5).
4. Have students list and discuss specific ways to build and maintain effective customer relationships (E20.6.1-E2-.6.5).
5. Discuss types of skills, attitudes, and knowledge that are common requirements for all jobs in the horticulture industry (E20.6.4).

SELECTED TOOLS AND MATERIALS

Handout: Instructor-prepared worksheet

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Education for Employment/Work Experience Cooperative Education Program Instructional Materials Manual. Virginia Department of Education.
Working in Horticulture, Chapter 2. Richardson and Moore.

SECTION 2

PROGRAMS AND COURSES

The horticulture program and courses described in this section are based on the task analyses presented in Section I. The program and courses have been approved by the Virginia Department of Education.

To assist agricultural program developers and Horticulture instructors, this section is organized as follows:

Program description--Horticulture
Course description--Horticulture III
Suggested teaching sequence--Horticulture III
Course outline--Horticulture III
Course description--Horticulture IV
Suggested teaching sequence--Horticulture IV
Course outline--Horticulture IV
Course description--Horticulture V
Suggested teaching sequence--Horticulture V
Course outline--Horticulture V

Considering the occupational nature of the courses, it is strongly suggested that the teaching sequence for each course be reviewed and adapted according to established training plans for simulated or actual on-the-job work experiences and opportunities.

SECONDARY PROGRAMS AND COURSES

PROGRAM TITLE:	Horticulture
DESCRIPTION:	The horticulture program is a specialized occupational area in agricultural education. The program curriculum is based on the assumption that students have successfully completed Agricultural Science and Mechanics I and II. In addition to specific topics in the area of horticulture, the program stresses development of leadership abilities, work values, and attitudes.
CIP CODE:	01.0601
SUGGESTED GRADE LEVELS:	10, 11, 12

APPROVED COURSES	VA CODE	DOT CODE	DOT TITLE
Horticulture III	8034	The following occupational titles apply to all three courses:	
Horticulture IV	8036		
Horticulture V	8038	142.081-010	Floral Designer
		406.683-010	Greenskeeper II
		272.357-022	Horticultural and Nursery Products Salesperson
		405.131-010	Horticultural-Specialty Farming Supervisor
		405.684-014	Horticultural Worker I
		405.687-014	Horticultural Worker II
		406.684-014	Industrial-Commercial Groundskeeper
		405.161-018	Inside Horticultural-Specialty Grower
		408.161-010	Landscape Gardener
		408.687-014	Landscape Laborer
		408.684-010	Lawn-Service Worker
		180.167-042	Nursery Manager
		406.687-101	Parks and Grounds Groundskeeper
		405.361-010	Plant Propagator

HORTICULTURE III (8034)

COURSE DESCRIPTION:	Horticulture III is designed as a one-year, double-period, occupational preparation course offered at the tenth- or eleventh-grade level. The horticulture program is designed to assist students in developing the necessary knowledge, skills, habits, and attitudes for entry employment and advancement in areas such as floriculture, landscape design, greenhouse operation, nursery plant production, and turf management. Students receive instruction in using soil and other plant-growing media and in identifying, propagating, and growing horticultural plants in the greenhouse and land laboratory. Instruction is provided in safety practices and leadership development.
PREREQUISITE:	Agricultural Science and Mechanics II
SUGGESTED GRADE LEVEL:	10 or 11

Task/Competency Sequence

1.1	Follow departmental policies
1.2	Practice safety procedures
1.3	Plan laboratory project
1.4	Clean sales, work, and storage areas
2.1	Plan a supervised occupational experience program
2.2	Summarize records of SOEP
2.3	Develop and execute an agreement
2.4	Apply for an FFA proficiency award
2.5	Plan off-farm jobs
2.6	Identify fringe benefits and calculate monetary value
3.1	Demonstrate effective communication skills
3.2	Use accepted parliamentary procedure
3.3	Prepare and deliver a speech
3.4	Identify duties of FFA officers
3.5	Conduct or participate in a committee meeting
3.6	Conduct or participate in a panel discussion
3.7	Write a news release
3.8	Participate in an FFA public relations project
4.1	Take soil samples
4.2	Analyze soil samples to determine pH levels
4.3	Mix growing media materials and fertilizers
4.4	Shred planting media
4.5	Screen planting media
4.6	Pasturize soil
4.7	Apply lime or dolomite
4.8	Select, apply, and mix soil conditioners
4.9	Locate, shape, and form beds
4.10	Plow land
4.11	Disk land
4.12	Apply and mix fertilizers into soil beds

4.13 Till soil with hand tools
4.14 Till soil with power tools
4.15 Analyze soil samples to determine soluble salts content
5.1 Plant seeds
5.2 Transplant seedlings
5.3 Take softwood and semi-hardwood cuttings
5.4 Take hardwood cuttings
5.5 Apply rooting hormone
5.6 Root cuttings in media
5.7 Label plants or cuttings
5.8 Transplant rooted cuttings into pots or beds
5.9 Transplant liners to field
5.10 Make leaf cuttings
5.11 Make layered cuttings
5.12 Make rhizome cuttings
5.13 Divide roots, crowns, and tubers
5.14 Graft and bud plants
5.15 Treat seeds
6.1 Hand irrigate plants
6.2 Apply granular fertilizer to planted crops
6.3 Apply liquid fertilizer to planted crops
6.4 Space plants
6.5 Pinch flowering plants
6.6 Disbud plants
6.7 Prune plants
6.8 Stake and tie plants as they grow
6.9 Apply growth regulators
6.10 Force bulbs
7.1 Identify and report common diseases, weeds, and insect damage
7.2 Remove weeds manually
7.3 Remove weeds with power tools
7.4 Remove dead, diseased, or damaged plants and plant parts
7.5 Apply mulches
7.6 Dust crops
7.7 Mix pesticides
7.8 Apply insecticides and fungicides
7.9 Apply herbicides
7.10 Identify and report spray damage
7.11 Control animal pests
7.12 Fumigate greenhouse
18.2 Drive a tractor
18.5 Check tires and tire pressure on equipment
18.6 Service carburetor air cleaner
18.7 Replace spark plugs
18.8 Replace breaker points
18.9 Adjust engine idle speed setting
18.10 Service battery
18.11 Check radiator
18.12 Change oil and lubricate equipment
19.1 Clean and sharpen hand tools
19.2 Replace a broken tool handle
19.5 Repair electrical service cords
19.10 Repair wooden greenhouse benches
19.11 Paint greenhouse frames, equipment, and other structures

20.1 Define terms related to the nature, scope, and importance of the horticulture industry.
20.2 Identify and analyze job-related interests, aptitudes, and skills
20.3 Research and write a report on horticulture occupations
20.4 Locate job vacancies
20.5 Apply and interview for a job
20.6 Select and list qualities or traits needed for job success

HORTICULTURE III

CONTENT OUTLINE	TASK/COMPETENCY CODE
I. Orientation	
A. Departmental policies	P1.1
1. Student responsibilities	E1.1.1
2. Daily operation	E1.1.2
3. Safety procedures	E1.1.3
4. Instructional objectives and evaluation procedures	E1.1.4
B. Safety	P1.2
1. General safety rules	E1.2.1
2. Proper use of tools and equipment	E1.2.2
3. Fire extinguisher operation	E1.2.3
4. Safety signs, symbols, and color codes	E1.2.4
C. Laboratory project plans	P1.3
1. Securing of plan	E1.3.1
2. Bill of materials	E1.3.2
3. Cost estimates	E1.3.3
4. Project description	E1.3.4
D. Area maintenance	P1.4
1. Areas to be cleaned	E1.4.1
2. Storage areas	E1.4.2
3. Cleaning schedule	E1.4.3
4. Proper storage	E1.4.4
II. Supervised Occupational Experience Program (SOEP)	
A. SOEP plan	P2.1
1. Definition of SOE	E2.1.1
2. Types of programs	E2.1.2
3. Examples of programs	E2.1.3
4. Benefits	E2.1.4
5. Local opportunities	E2.1.5
6. Program selection	E2.1.6
B. SOEP records	P2.2
1. Enterprise records	E2.2.1
2. Placement program records	E2.2.2
3. Financial statements	E2.2.3, E2.2.4
4. SOEP evaluation	E2.2.5

CONTENT OUTLINE				TASK/COMPETENCY CODE
II.	C.	Work/training agreement		P2.3
		1.	Purposes of agreement	E2.3.1
		2.	Information contained in agreement	E2.3.2
		3.	Agreement completion	E2.3.3
	D.	FFA proficiency awards		P2.4
		1.	Selection of applicable awards	E2.4.1
		2.	Application information	E2.4.2
		3.	Application completion	E2.4.3
	E.	Off-farm jobs		P2.5
		1.	Characteristics of good placement program	E2.5.1
		2.	Program planning	E2.5.2
		3.	Appropriate placement station identification	E2.5.3
		4.	Job interview	E2.5.4
		5.	Employee productivity	E2.5.5
		6.	Special concerns with cooperative placement	E2.5.6
	F.	Fringe benefits		P2.6
		1.	Identification	E2.6.1
		2.	Monetary value to employee	E2.6.2
III.	Leadership Training			
	A.	Communication skills		P3.1
		1.	Verbal communication	E3.1.1
		2.	Effective listening	E3.1.2
		3.	Written communication	E3.1.3
		4.	Effective directions	E3.1.4
		5.	Importance of good communication skills	E3.1.5
	B.	Parliamentary procedure		P3.2
		1.	Need for parliamentary procedure	E3.2.1
		2.	Kinds of motions	E3.2.2
		3.	Characteristics of motions	E3.2.3
		4.	Correct use	E3.2.4
	C.	Speech preparation and delivery		P3.3
		1.	Values of public speaking contest participation	E3.3.1
		2.	Types of speeches	E3.3.2
		3.	Qualities of a good speaker	E3.3.3

CONTENT OUTLINE	TASK/COMPETENCY CODE
III. D. FFA officers	P3.4
1. Officer identification	E3.4.1
2. Duties and responsibilities	E3.4.2
E. FFA committees	E3.5
1. Benefits of committees	E3.5.1
2. Duties of committee chairpersons	E3.5.2
3. Committee reports	E3.5.3
F. Panel discussions	P3.6
1. Benefits as a learning tool	E3.6.1
2. Duties of leader	E3.6.2
3. Objectives to be accomplished	E3.6.3
4. Characteristics of effective oral communication	E3.6.4
G. News release	P3.7
1. Descriptive writing	E3.7.1
2. Grammar and writing techniques	E3.7.2
3. Information covered	E3.7.3
4. Format	E3.7.4
H. Public relations project	P3.8
1. Purposes	E3.8.1
2. Project determination	E3.8.2
3. Materials needed	E3.8.3
4. Format	E3.8.4
5. Materials preparation	E3.8.5
6. Project critique and corrections	E3.8.6
7. Materials presentation	E3.8.7
IV. Soil and Growing Media	
A. Procedure for taking soil samples	P4.1
1. General area identification	E4.1.1
2. Sample collection	E4.1.2
3. Soil mixing procedure	E4.1.3
4. Air-drying procedure	E4.1.4
5. Preparation for testing	E4.1.5
6. Equipment maintenance	E4.1.6

CONTENT OUTLINE	TASK/COMPETENCY CODE
IV. B. Soil sample analysis	P4.2
1. pH relationship to plant nutrition	E4.2.1
2. pH scale	E4.2.2
3. Testing procedures	E4.2.3
4. Test equipment maintenance	E4.2.4
C. Growing media/fertilizer mix	P4.3
1. Texture factors	E4.3.1
2. Ratios and measurements	E4.3.2
3. Mixing procedures	E4.3.3, E4.3.4
4. Mixture storage	E4.3.5
D. Planting media shredding procedure	P4.4
1. Proper moisture levels	E4.4.1
2. Safety precautions	E4.4.2
3. Shredder operation	E4.4.3-E4.4.5
E. Planting media screening procedure	P4.5
1. Medium identification	E4.5.1
2. Screening procedure	E4.5.2-E4.5.6
3. Equipment maintenance	E4.5.7
F. Soil pasteurization	P4.6
1. Reasons for pasteurization	E4.6.1
2. Equipment selection	E4.6.2
3. Heat method	E4.6.3
4. Chemical method	E4.6.4, E4.6.5
5. Safety precautions	E4.6.6
G. Lime or dolomite application	P4.7
1. Lime types, uses, and effectiveness factors	E4.7.1
2. Application rates	E4.7.2
3. Application procedure	E4.7.3
H. Soil conditions	P4.8
1. Soil test results	E4.8.1
2. Definitions	E4.8.2
3. Conditioner selection	E4.8.3
4. Mixing procedure	E4.8.4

CONTENT OUTLINE	TASK/COMPETENCY CODE
IV. I. Bed location, shape, and form	P4.9
1. Location procedure	E4.9.1
2. Shaping or forming procedure	E4.9.2
J. Plowing	P4.10
1. Reasons	E4.10.1
2. Safety precautions	E4.10.2
3. Tractor servicing	E4.10.3, E4.10.9
4. Tractor operation	E4.10.4, E4.10.5
5. Plowing procedure	E4.10.6-E4.10.8
K. Disking	P4.11
1. Purpose	E4.11.1
2. Tractor operation	E4.11.2
3. Tractor and disk harrow servicing procedures	E4.11.3, E4.11.7
4. Disking procedure	E4.11.4-E4.11.6
5. Safety precautions	E4.11.8
L. Application of fertilizer to soil beds	P4.12
1. Major fertilizer components	E4.12.1
2. Fertilizer forms	E4.12.2
3. Soil requirements	E4.12.3
4. Hand application	E4.12.4
5. Mechanical application	E4.12.5-E4.12.8
M. Tilling with hand tools	P4.13
1. Tool identification	E4.13.1
2 Double-digging procedure	E4.13.2
3. Tool and equipment use	E4.13.3
N. Tilling with power tools	P4.14
1. Safety precautions	E4.14.1
2. Rotary tiller operation and service	E4.14.2, E4.14.3, E4.14.8
3. Tilling procedure	E4.14.5-E4.14.7

CONTENT OUTLINE	TASK/COMPETENCY CODE
IV. O. Soluble salts test	P4.15
1. Sources and effects of soluble salts on the soil	E4.15.1
2. Test procedure	E4.15.2-E4.15.5
3. Results interpretation	E4.15.6, E4.15.7
4. Equipment maintenance	E4.15.8
V. Propagation of Seeds, Cuttings, and Plants	
A. Planting of seeds	P5.1
1. Germination factors	E5.1.1
2. Planting procedure	E5.1.2
B. Transplanting of seedlings	P5.2
1. Procedure for transplanting into containers	E5.2.1
2. Procedure for transplanting into beds	E5.2.2
3. Equipment maintenance	E5.2.3
C. Softwood and semi-hardwood cuttings	P5.3
1. Basic parts of plant	E5.3.1
2. Types of cuttings	E5.3.2
3. Reasons for propagation by cuttings	E5.3.3
4. Selection of plants for cuttings	E5.3.4
5. Cutting procedure	E5.3.5, E5.3.6
6. Equipment maintenance	E5.3.7
D. Hardwood cuttings	P5.4
1. Definitions	E5.4.1
2. Types of trees/shrubs commonly propagated by cutting	E5.4.2
3. Selection of trees/shrubs for cuttings	E5.4.3
4. Cutting procedure	E5.4.4, E5.4.5
5. Equipment maintenance	E5.4.6
E. Rooting hormones	P5.5
1. Types of rooting hormones	E5.5.1
2. Hormone selection factors	E5.5.2, E5.5.3
3. Application procedure	E5.5.4-E5.5.8

CONTENT OUTLINE			TASK/COMPETENCY CODE
V.	F.	Planting procedures for cuttings	P5.6
		1. Preparation for planting	E5.6.1
		2. Space and depth requirements	E5.6.2
		3. Planting procedure	E5.6.3
		4. Water and heat regulation	E5.6.4-E5.6.6
		5. Equipment maintenance	E5.6.7
	G.	Labels	P5.7
		1. Identification of plants to be labeled	E5.7.1
		2. Label materials	E5.7.2
		3. Labeling procedure	E5.7.3, E5.7.4
		4. Plant placement	E5.7.5, E5.7.6
	H.	Transplanting of rooted cuttings	P5.8
		1. Types of root systems and growth irregularities	E5.8.1
		2. Cutting procedure	E5.8.2
		3. Transplanting procedure	E5.8.3-E5.8.5
		4. Work area and equipment maintenance	E5.8.6
	I.	Transplanting of liners to field	P5.9
		1. Soil preparation	E5.9.1, E5.9.2
		2. Transplanting procedure	E5.9.3-E5.9.7
		3. Post-transplant field treatment	E5.9.8
	J.	Leaf cuttings	P5.10
		1. Foliage plants propagated by leaf cuttings	E5.10.1
		2. Parts of a leaf	E5.10.2
		3. Leaf cutting procedure	E5.10.3
	K.	Layered cuttings	P5.11
		1. Reasons for layerage	E5.11.1
		2. Plant selection	E5.11.2
		3. Layered cutting procedure	E5.11.3

CONTENT OUTLINE				TASK/COMPETENCY CODE
V.	L.	Rhizome cuttings		P5.12
		1.	Definitions	E5.12.1
		2.	Common propagation methods	E5.12.2
		3.	Rhizome cutting procedure	E5.12.3
	M.	Division of roots, crowns, and tubers		P5.13
		1.	Plants propagated by division	E5.13.1
		2.	Growth forms that allow division	E5.13.2
		3.	Division procedure	E5.13.3
	N.	Grafts and buds		P5.14
		1.	Factors for success in grafting or budding	E5.14.1
		2.	Stock and scion plants	E5.14.2
		3.	Grafting and budding procedures	E5.14.3
	O.	Seed treatment		P5.15
		1.	Plant identification	E5.15.1
		2.	Germination inhibitors	E5.15.2
		3.	Seed-cleaning techniques	E5.15.3
		4.	Seed treatment techniques	E5.15.4
VI.	Greenhouse and Nursery Plant Cultivation			
	A.	Hand irrigation of plants		P6.1
		1.	Effects of watering techniques	E6.1.1
		2.	Determination of plant need for water	E6.1.2
		3.	Hand irrigation procedure	E6.1.3, E6.1.4
		4.	Effects of improper watering techniques	E6.1.5
	B.	Granular fertilizer application		P6.2
		1.	Advantages of granular fertilizers	E6.2.1
		2.	Types of application techniques and equipment	E6.2.2
		3.	Application by spreader	E6.2.3-E6.2.7
		4.	Application by hand	E6.2.8
		5.	Safety precautions	E6.2.9

CONTENT OUTLINE	TASK/COMPETENCY CODE
VI. C. Liquid fertilizer application	P6.3
1. Advantages of liquid fertilizers	E6.3.1
2. Fertilizer injector operation	E6.3.2-E6.3.6
3. Effects of fertilizers on crop growth	E6.3.7
4. Safety precautions	E6.3.8
D. Plant spacing requirements	P6.4
1. Plant competition	E6.4.1
2. Space requirements	E6.4.2
E. Plant pinching procedure	P6.5
1. Plant selection	E6.5.1
2. Pinching operation	E6.5.2, E6.5.3
3. Effects	E6.5.4
F. Plant disbudding procedure	P6.6
1. Plant selection	E6.6.1, E6.6.2
2. Disbudding operation	E6.6.3, E6.6.4
G. Plant pruning procedure	P6.7
1. Plant selection	E6.7.1
2. Reasons for pruning	E6.7.2
3. Pruning operation	E6.7.3-E6.7.9
H. Plant staking/tying procedure	P6.8
1. Plant selection	E6.8.1
2. Staking/tying operation	E6.8.2, E6.8.3
3. Tool storage	E6.8.4
I. Growth regulator application	P6.9
1. Spray treatment	E6.9.1
2. Drench treatment	E6.9.2
J. Bulb forcing procedure	P6.10
1. Bulb life cycle	E6.10.1
2. Necessity for fungicide	E6.10.2
3. Bulb forcing operation	E6.10.3-E6.10.6

CONTENT OUTLINE	TASK/COMPETENCY CODE
VII. Pest Control	
A. Diseases, weeds, and insect damage	P7.1
1. Identification of common diseases, weeds, and insects	E7.1.1
2. Areas to find diseases, weeds, and insects	E7.1.2
3. Insect damage versus disease damage	E7.1.3
4. Damage report	E7.1.4
B. Manual removal of weeds	P7.2
1. Weed identification	E7.2.1
2. Weed removal operation	E7.2.2, E7.2.3
C. Removal of weeds with power tools	P7.3
1. Field area identification	E7.3.1
2. Tractor/cultivator service and adjustments	E7.3.2, E7.3.3
3. Weeding operation	E7.3.4, E7.3.5
4. Safety precautions	E7.3.6
D. Removal of dead, diseased, or damaged plants or plant parts	P7.4
1. Reasons for removal	E7.4.1
2. Pest control techniques	E7.4.2, E7.4.3
3. Plant and plant part removal/disposal	E7.4.4, E7.4.5
E. Mulch application	P7.5
1. Types of mulches	E7.5.1
2. Purposes of mulch	E7.5.2
3. Soil and plant preparation	E7.5.3
4. Mulch spreading procedure	E7.5.4
F. Crop-dusting procedure	P7.6
1. Disease or pest identification	E7.6.1
2. Crop-dusting methods	E7.6.2
3. Chemical selection	E7.6.3, E7.6.4
4. Safety precautions	E7.6.5
5. Crop-dusting operation	E7.6.6

CONTENT OUTLINE				TASK/COMPETENCY CODE
VII.	G.		Pesticide mixes	P7.7
		1.	Procedure determination	E7.7.1
		2.	Safety precautions	E7.7.2
		3.	Mixing procedure	E7.7.3, E7.7.4
	H.		Insecticide/fungicide application	P7.8
		1.	Pest identification	E7.8.1
		2.	Pest control methods	E7.8.2
		3.	Application procedure	E7.8.3-E7.8.9
	I.		Herbicide application	P7.9
		1.	Sprayer servicing procedure	E7.9.1
		2.	Sprayer calibration	E7.9.2
		3.	Safety precautions	E7.9.3
		4.	Sprayer operation	E7.9.4, E7.9.5
		5.	Equipment maintenance	E7.9.7
		6.	Differences in dusting, spraying, and granule	E7.9.6
	J.		Spray damage	P7.10
		1.	Characteristics	E7.10.1
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CONTENT OUTLINE				TASK/COMPETENCY CODE
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		2.	Equipment selection	E19.1.2
		3.	Safety precautions	E19.1.3
		4.	Sharpening procedure	E19.1.4-E19.1.8
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		2.	Reconditioning of tool	E19.2.3
		3.	New handle placement	E19.2.4- E19.2.6
	C.	Electrical service cord repair		P19.5
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	D.	Wooden bench repair		P19.10
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		1.	Surface preparation	E19.11.1
		2.	Paint mixing procedure	E19.11.2, E19.11.3
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		2.	Branches of horticulture	E20.1.2, E20.1.3
		3.	Effects of climate on horticultural industry	E20.1.4
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		2.	Interest inventory	E20.2.2

CONTENT OUTLINE				TASK/COMPETENCY CODE
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		4.	Marketable skills	E20.2.4
		5.	Career goals	E20.2.5
	C.	Career/job opportunities		P20.3
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		2.	Information collection	E20.3.2, E20.3.3
		3.	Skill requirements	E20.3.4
		4.	Typical career ladder	E20.3.5
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		2.	Consideration factors	E20.4.2
		3.	Classified ads	E20.4.3
		4.	Part-time employment	E20.4.4
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		2.	Application procedure	E20.5.2-E20.5.4
		3.	Interview	E20.5.5-E20.5.7
	F.	Qualities for job success		P20.6
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		2.	Personal traits	E20.6.2, E20.6.3
		3.	Technical knowledge	E20.6.4
		4.	Effective customer relations	E20.6.5

HORTICULTURE IV (8036)

COURSE DESCRIPTION: Horticulture IV is designed as a one-year, double-period, occupational preparation course offered at the eleventh- or twelfth-grade level. Units of instruction include growing greenhouse crops; producing and maintaining nursery crops; establishing, maintaining, and designing landscape plantings; establishing and maintaining turfgrass; and operating a flower shop and garden center. Leadership skills continue to be developed.

PREREQUISITE: Horticulture III

SUGGESTED GRADE LEVEL: 11 or 12

Task/Competency

2.1 Plan a supervised occupational experience program
2.2 Summarize records of SOEP
2.3 Develop and execute an agreement
2.4 Apply for an FFA proficiency award
2.5 Plan off-farm jobs
2.6 Identify fringe benefits and calculate monetary value
3.1 Demonstrate effective communication skills
3.2 Use accepted parliamentary procedure
3.3 Prepare and deliver a speech
3.4 Identify duties of FFA officers
3.5 Conduct or participate in a committee meeting
3.6 Conduct or participate in a panel discussion
3.7 Write a news release
3.8 Participate in an FFA public relations project
8.1 Set automatic devices to control greenhouse temperature, humidity, and ventilation
8.2 Control cold frame temperature
8.3 Install heating cables or mats
8.4 Install shade cloth
8.5 Install black cloth
8.6 Apply shading material to greenhouse covering
8.7 Install artifical lighting system
9.1 Inventory plants
9.2 Pot plants for sale
9.3 Label plants for sale
9.4 Groom plants for sale
9.5 Grade plants and flowers
9.6 Cull unsaleable greenhouse plants and flowers
9.7 Select and remove saleable plants from beds or benches
9.8 Load and move plants or flowers to packing area or house
9.9 Cut flowers
9.10 Count and bunch flowers
9.11 Prepare and place flowers in water or preservatives
9.12 Prepare and place cut flowers in storage
9.13 Top and dig bulbs or corms

9.14 Dig up trees and shrubs
9.15 Ball and burlap trees and shrubs
9.16 Remove bedwire from harvested crops
9.17 Cut and stack sod
10.1 Check received merchandise against invoice listing
10.2 Store received supplies
10.3 Bunch, pack, and wrap plants for shipment
10.4 Assemble shipping boxes
10.5 Package orders for shipment
10.6 Complete invoices and shipping labels
10.7 Load customer's vehicle
10.8 Overwinter containerized plants
11.1 Make bows
11.2 Dress potted plants
11.3 Wire flowers for arrangements and corsages
11.4 Make nets or fans
11.5 Spray-tint dried and live floral products
11.6 Design corsages
11.7 Design bud vases
11.8 Design artificial flower and foliage arrangements
11.9 Design symmetrically balanced triangular arrangements
11.10 Design right-angle arrangements
11.11 Design vertically shaped arrangements
11.12 Design Hogarth-shaped arrangements
11.13 Design novelty arrangements
11.14 Design oval arrangements
11.15 Design crescent arrangements
11.16 Design wreaths
11.17 Design planters
11.18 Design dish gardens
11.19 Design terraria
11.20 Set up and dismantle church decorations
11.21 Set up and dismantle wedding decorations
14.1 Write monthly statements
14.2 Keep business records
14.3 Keep production records
14.4 Keep maintenance records
14.5 Keep cultivation records
14.6 Keep an inventory of plants, equipment, and supplies
14.7 Call merchandise orders to suppliers
15.1 Haul and spread topsoil
15.2 Grade soil
15.3 Prepare seedbed for turf
15.4 Sow grass seed
15.5 Establish turf by vegetative methods
15.6 Transplant bare-root trees and shrubs
15.7 Transplant balled and burlapped trees and shrubs
15.8 Transplant container trees and shrubs
15.9 Brace newly planted trees
15.10 Plant annual flowers
15.11 Plant bulbs and related structures
16.1 Mow lawns
16.2 Trim lawns
16.3 Mow golf greens

16.4 Select appropriate sprinkler heads and irrigate turf
16.5 Fertilize and lime turf
16.6 Aerate turf
16.7 Dethatch turf
16.8 Overseed turf
16.9 Repair worn turf areas
16.10 Fill in holes or depressions in turf
16.11 List ways erosion can be prevented or remedied
16.12 Clean grounds of leaves and litter
16.13 Fertilize plant beds
16.14 Fertilize shrubs
16.15 Fertilize trees by the "punch bar" method
16.16 Water landscape plants
16.17 Mulch plants and plantings
16.18 Weed landscape beds
16.19 Remove grass from landscape bed edges
16.20 Prune trees and shrubs
16.21 Train (espalier) plants
17.1 Construct a plant-holding fan trellis
17.2 Construct fences
17.3 Construct ornamental stone walls
17.4 Install edging for planting beds
17.5 Construct raised planting bed
17.6 Clean ornamental pools
17.7 Relocate cups on golf course
17.8 Repair potholes in an asphalt street or parking lot
17.9 Repair concrete driveways
17.10 Sweep parking areas
17.11 Remove snow from sidewalks and driveways
17.12 Spread salt on icy sidewalks and driveways
17.13 Construct walls, walks, and other landscape structures
18.1 Operate pickup truck
18.3 Calibrate a tractor-mounted sprayer
18.4 Apply chemicals, using a tractor-mounted sprayer
19.3 Repair irrigation and spray system plumbing
19.4 Sharpen and balance rotary mower blade
19.6 Replace and glaze broken greenhouse lights
19.7 Replace plastic covering for greenhouse
19.8 Replace damaged section of shade cloth
19.9 Replace damaged support wires for shade or black cloth

HORTICULTURE IV

CONTENT OUTLINE	TASK/COMPETENCY CODE
I. Supervised Occupational Experience Program*	
A. SOEP plan	P2.1
1. Definition of SOE	E2.1.1
2. Types of programs	E2.1.2
3. Examples of programs	E2.1.3
4. Benefits	E2.1.4
5. Local opportunities	E2.1.5
6. Program selection	E2.1.6
B. SOEP records	P2.2
1. Enterprise records	E2.2.1
2. Placement program records	E2.2.2
3. Financial statements	E2.2.3, E2.2.4
4. SOEP evaluation	E2.2.5
C. Work/training agreement	P2.3
1. Purposes of agreement	E2.3.1
2. Information contained in agreement	E2.3.2
3. Agreement completion	E2.3.3
D. FFA proficiency awards	P2.4
1. Selection of applicable awards	E2.4.1
2. Application information	E2.4.2
3. Application completion	E2.4.3
E. Off-farm jobs	P2.5
1. Characteristics of placement programs	E2.5.1
2. Program planning	E2.5.2
3. Appropriate placement station identification	E2.5.3
4. Job interview	E2.5.4
5. Employee productivity	E2.5.5
6. Special concerns with cooperative placement	E2.5.6
F. Fringe benefits	P2.6
1. Identification	E2.6.1
2. Monetary value to employee	E2.6.2

*Continuation of tasks begun in Horticulture III

CONTENT OUTLINE	TASK/COMPETENCY CODE
II. Leadership Training*	
A. Communication skills	P3.1
1. Verbal communication	E3.1.1
2. Effective listening	E3.1.2
3. Written communication	E3.1.3
4. Effective directions	E3.1.4
5. Importance of good communication	E3.1.5
B. Parliamentary procedure	P3.2
1. Need for parliamentary procedure	E3.2.1
2. Kinds of motions	E3.2.2
3. Characteristics of motions	E3.2.3
4. Correct use	E3.2.4
C. Speech preparation and delivery	P3.3
1. Values of public speaking contest participation	E3.3.1
2. Types of speeches	E3.3.2
3. Qualities of a good speaker	E3.3.3
D. FFA officers	P3.4
1. Officer identification	E3.4.1
2. Duties and responsibilities	E3.4.2
E. FFA committees	P3.5
1. Benefits of committees	E3.5.1
2. Duties of committee chairperson	E3.5.2
3. Committee reports	E3.5.3
F. Panel discussions	P3.6
1. Benefits as a learning tool	E3.6.1
2. Duties of leader	E3.6.2
3. Objectives to be accomplished	E3.6.3
4. Characteristics of effective oral communication	E3.6.4
G. News release	P.3.7
1. Descriptive writing	E3.7.1
2. Grammar and writing techniques	E3.7.2
3. Information covered	E3.7.3
4. Format	E3.7.4

*Continuation of tasks begun in Horticulture III

CONTENT OUTLINE	TASK/COMPETENCY CODE
II. H. Public relations project	P3.8
1. Purposes	E3.8.1
2. Project determination	E3.8.2
3. Information covered	E3.8.3
4. Format	E3.8.4
III. Environmental Control Systems and Devices	
A. Greenhouse environmental control	P8.1
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2. Heat loss calculation	E8.1.2
3. Environment regulation methods	E8.1.3, E8.1.4
4. Environment regulation procedure	E8.1.5-E8.1.7
5. Temperature and humidity maintenance	E8.1.8, E8.1.9
B. Cold frame temperature control	P8.2
1. Controls operation	E8.2.1
2. Controls procedure	E8.2.2-E8.2.4
C. Heating devices installation	P8.3
1. Definition	E8.3.1
2. Installation procedure	E8.3.2
3. Safety procedure	E8.3.3
D. Shade cloth installation	P8.4
1. Shadehouse area selection and purpose	E8.4.1
2. Installation procedure	E8.4.2-E8.4.5
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E. Black cloth installation	P8.5
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2. Installation procedure	E8.5.2-E8.5.5, E8.5.7
3. Equipment storage	E8.5.6
F. Shading material application	P8.6
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2. Types	E8.6.2
3. Application procedure	E8.6.3-E8.6.5
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5. Removal techniques	E8.6.7

CONTENT OUTLINE	TASK/COMPETENCY CODE
III. G. Lighting system installation	P8.7
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2. Adjustment procedure	E8.7.5
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2. Crop inventory importance	E9.1.2
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2. Root characteristics	E9.2.2
3. Bound plant symptoms	E9.2.3
4. Potting procedure	E9.2.4-E9.2.8
C. Labels	P9.3
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2. Chart and guide identification	E9.3.2
3. Labeling procedure	E9.3.3
D. Plant grooming procedures	P9.4
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E. Plant grading procedures	P9.5
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F. Unsaleable flower removal	P9.6
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G. Saleable plant selection	P9.7
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CONTENT OUTLINE			TASK/COMPETENCY CODE
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	K.	Cut flower preservation	P9.11
	1.	Stem treatment	E9.11.1
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	L.	Cut flower storage	P9.12
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	2.	Flower preservation preparation	E9.12.2
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	M.	Bulb or corm harvesting procedures	P9.13
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	2.	Bulb selection	E9.13.2
	3.	Equipment operation	E9.13.3, E9.13.8
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	5.	Safety precautions	E9.13.9
	N.	Tree and shrub digging operations	P9.14
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	P.	Bedwire removal	P9.16
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CONTENT OUTLINE	TASK/COMPETENCY CODE
V. Plant and Supply Storage and Shipment	
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2. Invoice checking method	E10.1.2-E10.1.7
B. Supply storage	P10.2
1. Chemical storage procedure	E10.2.1
2. Supply storage procedure	E10.2.2-E10.2.5
C. Plant shipment preparation	P10.3
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2. Plant preparation	E10.3.2-E10.3.9
D. Box assembly	P10.4
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2. Assembly procedure	E10.4.2-E10.4.4
3. Area maintenance	E10.4.5
E. Shipment operation	P10.5
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2. Plant and shipment method correlation	E10.5.2
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4. Area maintenance	E10.5.4
F. Label and invoice completion	P10.6
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G. Vehicle loading procedures	P10.7
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2. Customer relations	E10.7.2
3. Loading method	E10.7.3-E10.7.5
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2. Prevention procedure	E10.8.2-E10.8.5
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CONTENT OUTLINE			TASK/COMPETENCY CODE
VI.	B.	Dressed plants	P11.2
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	2.	Dressing procedure	E11.2.2-E11.2.6
	C.	Wiring flowers procedures	P11.3
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	2.	Flower wiring procedure	E11.3.2
	D.	Fan and net construction	P11.4
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	2.	Decorative uses	E11.4.2
	3.	Construction procedure	E11.4.3
	E.	Floral spray-tinting procedures	P11.5
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	F.	Corsage construction	P11.6
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	2.	Planning procedure	E11.6.2, E11.6.3
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	G.	Bud vase construction	P11.7
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	2.	Tool and supply selection	E11.7.2
	3.	Flower number determination	E11.7.3
	4.	Planning procedure	E11.7.4, E11.7.5
	5.	Bud vase assembly	E11.7.6
	H.	Artificial flower arrangements	P11.8
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	5.	Arrangement construction	E11.8.7, E11.8.8
	I.	Triangular arrangements	P11.9
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	2.	Tool and material selection	E11.9.3, E11.9.4
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CONTENT OUTLINE	TASK/COMPETENCY CODE
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2. Arrangement procedure	E11.10.2
3. Flower selection	E11.10.3
K. Vertically shaped arrangements	P11.11
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2. Tool and material selection	E11.11.3, E11.11.4
3. Arrangement construction	E11.11.5, E11.11.6
L. Hogarth-shaped arrangement	P11.12
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N. Oval arrangements	P11.14
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O. Crescent arrangements	P11.15
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P. Wreath construction	P11.16
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2. Tool and material selection	E11.16.2, E11.16.3
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CONTENT OUTLINE			TASK/COMPETENCY CODE
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		4. Clean-up procedure	E11.20.7, E11.20.12
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	U.	Wedding decorations assembly and disassembly	P11.21
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HORTICULTURE V (8038)

COURSE DESCRIPTION: Horticulture V is a one-year, advanced, optional occupational preparation course offered at the twelfth-grade level. Much of the instruction may be provided through individualized instruction. Cooperative education is recommended as a part of this course. Major learning areas include planning and managing horticulture facilities and crops; managing horticultural businesses; and merchandising, advertising, displaying, and selling horticultural products and services. Leadership development is emphasized.

PREREQUISITE: Horticulture IV

SUGGESTED GRADE LEVEL: 12

Task/Competency Sequence

2.1 Plan a supervised occupational experience program
2.2 Summarize records of SOEP
2.3 Develop and execute an agreement
2.4 Apply for an FFA proficiency award
2.5 Plan off-farm jobs
2.6 Identify fringe benefits and calculate monetary value
3.1 Demonstrate effective communication skills
3.2 Use accepted parliamentary procedure
3.3 Prepare and deliver a speech
3.4 Identify duties of FFA officers
3.5 Conduct or participate in a committee meeting
3.6 Conduct or participate in a panel discussion
3.7 Write a news release
3.8 Participate in an FFA public relations project
8.8 Regulate lighting system time clocks
8.9 Install automatic irrigation and fertilization equipment
8.10 Regulate automatic irrigation equipment
8.11 Pump water for irrigation
8.12 Raise or elevate bedwire
12.1 Check in incoming merchandise
12.2 Unpack plant materials and merchandise
12.3 Condition flowers and plants
12.4 Maintain plants
12.5 Attach care cards to plants
12.6 Assemble corsage and cut flower boxes
12.7 Stock shelves, gondolas, and counter tops
12.8 Set up manufacturer's displays
12.9 Design and letter show cards
12.10 Set up counter and table-top displays
12.11 Arrange displays for salesroom cooler
12.12 Build window displays
12.13 Build exterior displays

12.14 Price merchandise
13.1 Provide customer with product information
13.2 Wrap merchandise
13.3 Write messages on enclosure cards
13.4 Write sales tickets and receive payments
13.5 Write up telephone orders
13.6 Route deliveries
13.7 Wire flowers by telephone
15.12 Plan and draw small scale landscape
15.13 Plan and draw interior landscape designs
15.14 Install landscape according to plan
15.15 Install interior landscape according to plan
16.22 Winterize plants and trees
16.23 Protect new plants from direct sunlight
16.24 Remove dead or unwanted trees
16.25 Maintain interior landscape
16.26 Develop fertilization schedule
18.13 Clean and oil electric motors
18.14 Operate chain saw

HORTICULTURE V

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2. Information contained in agreement	E2.3.2
3. Agreement completion	E2.3.3
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2. Application information	E2.4.2
3. Application completion	E2.4.3
E. Off-farm jobs	P2.5
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2. Program planning	E2.5.2
3. Appropriate placement station identification	E2.5.3
4. Job interview	E2.5.4
5. Employee productivity	E2.5.5
6. Special concerns with cooperative placement	E2.5.6
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*Continuation of tasks begun in Horticulture III

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*Continuation of tasks begun in Horticulture III

CONTENT OUTLINE				TASK/COMPETENCY CODE
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CONTENT OUTLINE				TASK/COMPETENCY CODE
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CONTENT OUTLINE			TASK/COMPETENCY CODE
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APPENDIX

Three major sections compose the Appendix. The first section, References, is a listing of all materials used in the development of this guide. The second section is a listing of valuable instructional aids designated by horticulture educators. An assortment of audiovisual materials are referenced in this guide, and as an aid to the teacher, the addresses of these publishers are listed. Additionally, the addresses of other producers of educational materials are included.

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Fruit Varieties Journal. Quarterly. American Pomological Society, 103 Tyson Building, University Park, Pennsylvania 16802.

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Grower Talks. Monthly. George J. Ball, Inc., West Chicago, Illinois 60185.

Home Horticulture. Monthly. Harcourt Brace Jovanovich Publications, 1.E. First Street, Duluth, Minnesota 55802.

Horticulture. Monthly. Subscription Department, 125 Garden Street, Marion, Ohio 43302.

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Landscape Architecture. Quarterly. American Society of Landscape Architects, 1750 Old Meadow Road, McLean, Virginia 22101.

Light Garden. Bimonthly. The Indoor Light Gardening Society of America, Inc., 423 Powell Drive, Bay Billage, Ohio 44140.

Nursery Business. 8 issues per year. Brentwood Publications, 850 Elm Grove Road, Elm Grove, Wisconsin 53122.

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Plants and Gardens. Quarterly. Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, New York 11225.

Teleflora Spirit. Monthly. Teleflora Incorporated, 2400 Compton Boulevard, Redondo Beach, California 90278.

Vegetable Growers Association of America News. Monthly. Vegetable Growers Association of America, 1616 H Street, NW, Washington, D.C. 20006.

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